

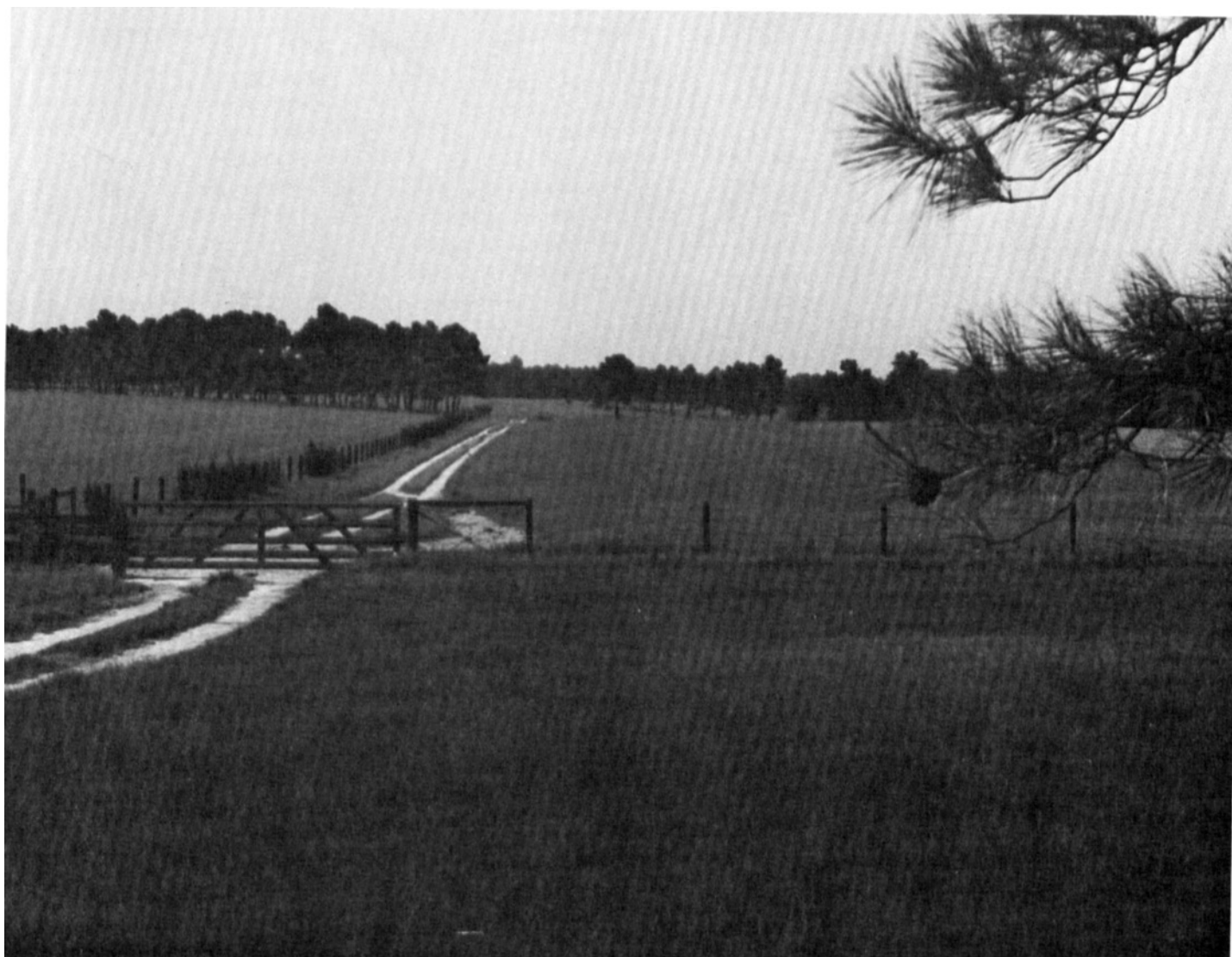


United States
Department of
Agriculture

Soil
Conservation
Service

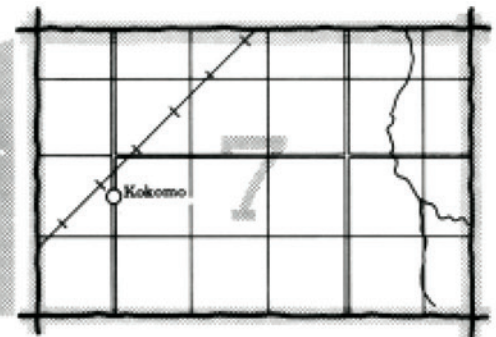
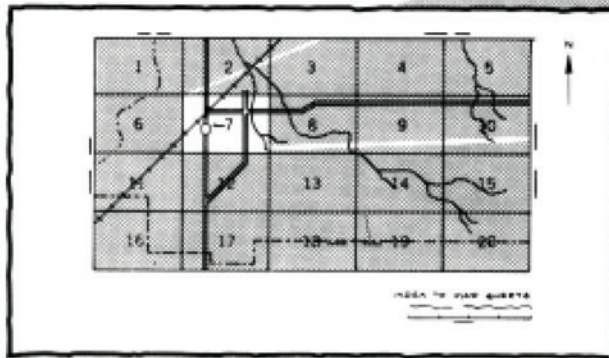
In Cooperation with
North Carolina Department of
Natural Resources and
Community Development,
North Carolina
Agricultural Research
Service
North Carolina
Agricultural Extension
Service,
United States Army,
Cumberland County Board of
Commissioners, and
The Hoke County Board of
Commissioners

Soil Survey of Cumberland and Hoke Counties North Carolina



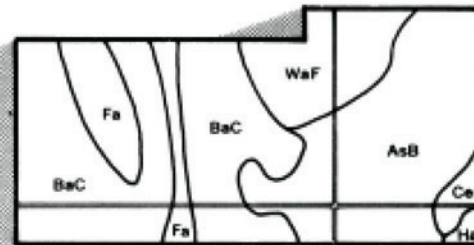
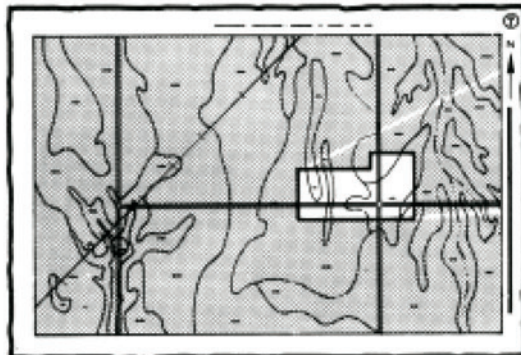
HOW TO USE

1. Locate your area of interest on the "Index to Map Sheets"

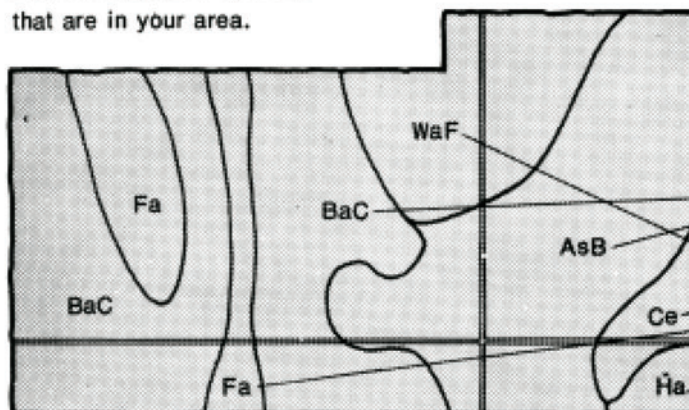


2. Note the number of the map sheet and turn to that sheet.

3. Locate your area of interest on the map sheet.



4. List the map unit symbols that are in your area.



Symbols

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BaC

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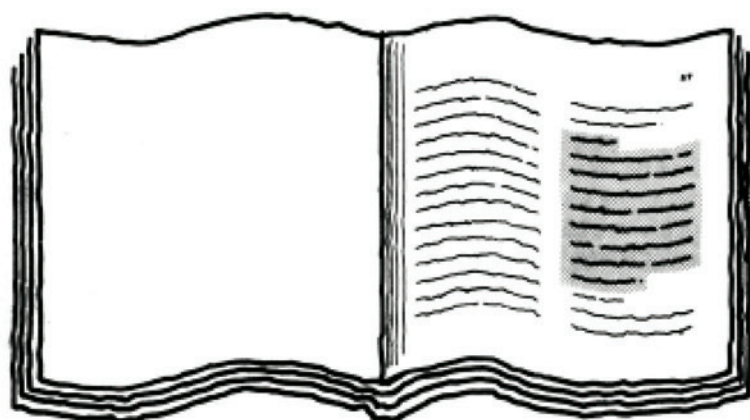
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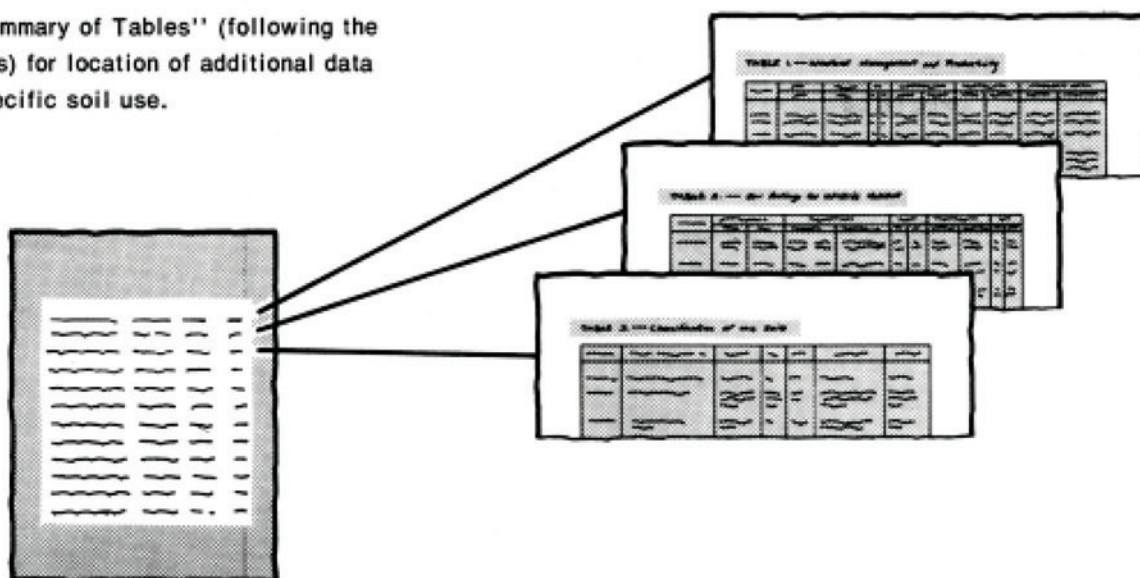
THIS SOIL SURVEY

5. Turn to "Index to Soil Map Units" which lists the name of each map unit and the page where that map unit is described.



Index to Soil Map Units			
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49. 1000000000	100	1000000000	100
50. 1000000000	100	1000000000	100

6. See "Summary of Tables" (following the Contents) for location of additional data on a specific soil use.



7. Consult "Contents" for parts of the publication that will meet your specific needs. This survey contains useful information for farmers or ranchers, foresters or agronomists; for planners, community decision makers, engineers, developers, builders, or homebuyers; for conservationists, recreationists, teachers, or students; to specialists in wildlife management, waste disposal, or pollution control.

This soil survey is a publication of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other federal agencies, state agencies including the North Carolina Agricultural Research Service, and local agencies. The Soil Conservation Service has leadership for the federal part of the National Cooperative Soil Survey. In line with Department of Agriculture policies, benefits of this program are available to all, regardless of race, color, national origin, sex, religion, marital status, or age.

Major fieldwork for this soil survey was completed in 1971-1980. Soil names and descriptions were approved in 1981. Unless otherwise indicated, statements in this publication refer to conditions in the survey area in 1981. This survey was made cooperatively by the Soil Conservation Service, the North Carolina Department of Natural Resources and Community Development, the North Carolina Agricultural Research Service, the North Carolina Agricultural Extension Service, the United States Army, the Cumberland County Board of Commissioners, and the Hoke County Board of Commissioners. It is part of the technical assistance furnished to the Cumberland and Hoke Soil and Water Conservation Districts.

Soil maps in this survey may be copied without permission. Enlargement of these maps, however, could cause misunderstanding of the detail of mapping. If enlarged, maps do not show the small areas of contrasting soils that could have been shown at a larger scale.

Cover: Pasture of Coastal bermudagrass on Candor sand.

Contents

Index to map units	iv	Woodland management and productivity.....	54
Summary of tables	v	Recreation.....	55
Foreword	vii	Wildlife habitat.....	55
General nature of the survey area.....	1	Engineering.....	57
How this survey was made.....	3	Soil properties	61
Map Unit Composition.....	3	Engineering index properties.....	61
General soil map units	5	Physical and chemical properties.....	62
Descriptions of map units in Cumberland County ...	5	Soil and water features.....	62
Descriptions of map units in Hoke County.....	10	Engineering index test data.....	63
Detailed soil map units	15	Formation of the soils	65
Soil descriptions.....	15	Classification of the soils	67
Use and management of the soils	49	Soil series and their morphology.....	68
Crops and pasture.....	49	References	93
Important farmland.....	53	Glossary	95
		Tables	101

soil series

Altavista series.....	68	Johnston series.....	81
Autryville series.....	68	Kalmia series.....	81
Aycock series.....	69	Kenansville series.....	81
Blaney series.....	69	Kureb series.....	82
Bragg series.....	70	Lakeland series.....	82
Butters series.....	70	Lenoir series.....	83
Byars series.....	71	Leon series.....	83
Candor series.....	71	Lynchburg series.....	84
Cape Fear series.....	72	Lynn Haven series.....	84
Chewacla series.....	72	McColl series.....	85
Coxville series.....	73	Nahunta series.....	85
Craven series.....	73	Norfolk series.....	86
Croatan series.....	74	Pactolus series.....	86
Deloss series.....	74	Pantego series.....	87
Dogue series.....	75	Rains series.....	87
Dothan series.....	75	Roanoke series.....	88
Dunbar series.....	76	Stallings series.....	88
Duplin series.....	77	Tarboro series.....	89
Dystrochrepts.....	77	Torhunta series.....	89
Exum series.....	78	Vaucluse series.....	90
Faceville series.....	78	Wagram series.....	90
Fuquay series.....	79	Wahee series.....	91
Gilead series.....	79	Wickham series.....	91
Goldsboro series.....	80	Woodington series.....	92
Grantham series.....	80		

Issued October 1984

Index to Map Units

AaA—Altavista fine sandy loam, 0 to 3 percent slopes.....	15	KeA—Kenansville loamy sand, 0 to 3 percent slopes.....	33
AuA—Autryville loamy sand, 0 to 2 percent slopes....	16	KuB—Kureb sand, 1 to 8 percent slopes	34
AyB—Aycock loam, 1 to 4 percent slopes	16	LaB—Lakeland sand, 1 to 8 percent slopes	34
BaB—Blaney loamy sand, 2 to 8 percent slopes	18	LbB—Lakeland-Urban land complex, 1 to 8 percent slopes.....	36
BaD—Blaney loamy sand, 8 to 15 percent slopes	18	Ld—Lenoir loam	36
BdB—Blaney-Urban land complex, 2 to 8 percent slopes.....	19	Le—Leon sand	36
BdD—Blaney-Urban land complex, 8 to 15 percent slopes.....	20	Ly—Lynchburg sandy loam.....	37
BrB—Bragg sandy loam, 1 to 4 percent slopes.....	20	Mc—McColl loam	37
BuA—Butters loamy sand, 0 to 2 percent slopes.....	21	Na—Nahunta loam.....	38
By—Byars loam	21	NoA—Norfolk loamy sand, 0 to 2 percent slopes	38
CaB—Candor sand, 1 to 8 percent slopes	21	NoB—Norfolk loamy sand, 2 to 6 percent slopes	38
CaD—Candor sand, 8 to 15 percent slopes.....	22	Pa—Pactolus loamy sand	39
Cf—Cape Fear loam	22	Pg—Pantego loam	39
Ch—Chewacla loam.....	23	Pt—Pits-Tarboro complex	40
Co—Coxville loam	24	Ra—Rains sandy loam	40
CrB—Craven loam, 1 to 4 percent slopes	24	Ro—Roanoke and Wahee loams.....	40
CT—Croatan muck.....	25	Ru—Roanoke-Urban land complex	42
De—Deloss loam	25	St—Stallings loamy sand.....	42
DgA—Dogue fine sandy loam, 0 to 2 percent slopes	26	TaB—Tarboro loamy sand, 0 to 6 percent slopes.....	42
DhA—Dothan loamy sand, 0 to 2 percent slopes	26	TR—Torhunta and Lynn Haven soils.....	44
Dn—Dunbar loam.....	26	Ud—Udorthents, loamy	45
DpA—Duplin sandy loam, 0 to 3 percent slopes	27	Ur—Urban land.....	45
DT—Dystrochrepts, steep.....	27	VaB—Vaucluse loamy sand, 2 to 8 percent slopes....	45
ExA—Exum loam, 0 to 2 percent slopes	28	VaD—Vaucluse loamy sand, 8 to 15 percent slopes..	45
FaA—Faceville loamy sand, 0 to 2 percent slopes	29	VgE—Vaucluse-Gilead loamy sands, 15 to 25 percent slopes	46
FaB—Faceville loamy sand, 2 to 6 percent slopes	29	WaB—Wagram loamy sand, 0 to 6 percent slopes....	46
FcB—Faceville-Urban land complex, 0 to 6 percent slopes.....	30	WgB—Wagram-Urban land complex, 0 to 8 percent slopes.....	47
FuB—Fuquay sand, 0 to 4 percent slopes	30	WmB—Wickham fine sandy loam, 1 to 6 percent slopes.....	47
GdB—Gilead loamy sand, 2 to 8 percent slopes.....	30	WnB—Wickham-Urban land complex, 1 to 6 percent slopes.....	48
GdD—Gilead loamy sand, 8 to 15 percent slopes	31	Wo—Woodington loamy sand	48
GoA—Goldsboro loamy sand, 0 to 2 percent slopes.	32		
Gr—Grantham loam.....	32		
JT—Johnston loam	33		
KaA—Kalmia loamy sand, 0 to 2 percent slopes	33		

Summary of Tables

Temperature and precipitation (table 1)	102
Freeze dates in spring and fall (table 2)	104
<i>Probability. Temperature.</i>	
Growing season (table 3)	105
<i>Probability. Daily minimum temperature.</i>	
Acreage and proportionate extent of the soils (table 4)	106
<i>Cumberland County. Hoke county. Total—Area, Extent.</i>	
Yields per acre of crops and pasture (table 5)	107
<i>Corn. Soybeans. Tobacco. Wheat. Cotton lint. Improved bermudagrass.</i>	
Capability classes and subclasses (table 6)	110
<i>Total acreage. Major management concerns.</i>	
Woodland management and productivity (table 7)	111
<i>Ordination symbol. Management concerns. Potential productivity. Trees to plant.</i>	
Recreational development (table 8)	115
<i>Camp areas. Picnic areas. Playgrounds. Paths and trails. Golf fairways.</i>	
Wildlife habitat (table 9)	119
<i>Potential for habitat elements. Potential as habitat for—Openland wildlife, Woodland wildlife, Wetland wildlife.</i>	
Building site development (table 10)	123
<i>Shallow excavations. Dwellings without basements. Dwellings with basements. Small commercial buildings. Local roads and streets. Lawns and landscaping.</i>	
Sanitary facilities (table 11)	127
<i>Septic tank absorption fields. Sewage lagoon areas. Trench sanitary landfill. Area sanitary landfill. Daily cover for landfill.</i>	
Construction materials (table 12)	132
<i>Roadfill. Sand. Topsoil.</i>	
Water management (table 13)	136
<i>Limitations for—Pond reservoir areas; Embankments, dikes, and levees; Aquifer-fed excavated ponds. Features affecting—Drainage, Terraces and diversions, Grassed waterways.</i>	

Engineering index properties (table 14)	140
<i>Depth. USDA texture. Classification—Unified, AASHTO.</i>	
<i>Fragments greater than 3 inches. Percentage passing</i>	
<i>sieve—4, 10, 40, 200. Liquid limit. Plasticity index.</i>	
Physical and chemical properties of the soils (table 15)	147
<i>Depth. Permeability. Available water capacity. Soil</i>	
<i>reaction. Shrink-swell potential. Erosion factors. Organic</i>	
<i>matter.</i>	
Soil and water features (table 16).....	151
<i>Hydrologic group. Flooding. High water table. Risk of</i>	
<i>corrosion.</i>	
Engineering index test data (table 17)	154
<i>Classification. Grain-size distribution. Liquid limit. Plasticity</i>	
<i>index. Moisture density.</i>	
Classification of the soils (table 18).....	155
<i>Family or higher taxonomic class.</i>	

Foreword

This soil survey contains information that can be used in land-planning programs in Cumberland and Hoke Counties. It contains predictions of soil behavior for selected land uses. The survey also highlights limitations and hazards inherent in the soil, improvements needed to overcome the limitations, and the impact of selected land uses on the environment.

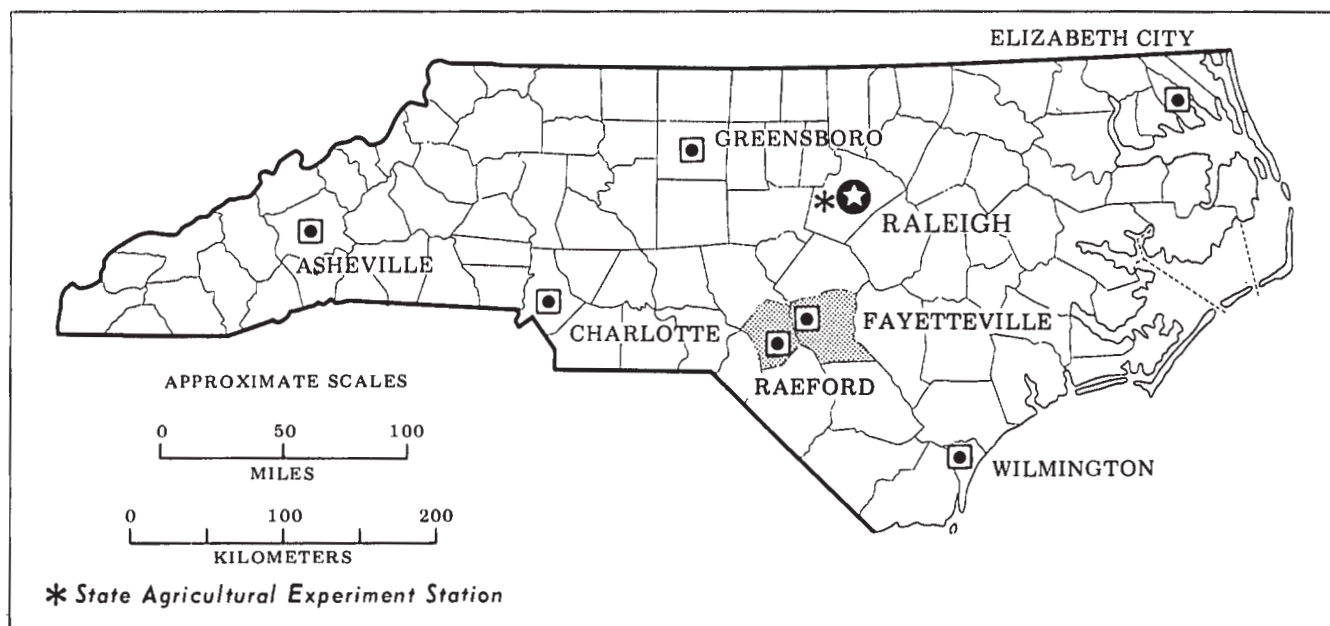
This soil survey is designed for many different users. Farmers, foresters, and agronomists can use it to evaluate the potential of the soil and the management needed for maximum food and fiber production. Planners, community officials, engineers, developers, builders, and home buyers can use the survey to plan land use, select sites for construction, and identify special practices needed to insure proper performance. Conservationists, teachers, students, and specialists in recreation, wildlife management, waste disposal, and pollution control can use the survey to help them understand, protect, and enhance the environment.

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

These and many other soil properties that affect land use are described in this soil survey. Broad areas of soils are shown on the general soil map. The location of each soil is shown on the detailed soil maps. Each soil in the survey area is described. Information on specific uses is given for each soil. Help in using this publication and additional information are available at the local office of the Soil Conservation Service or the North Carolina Agricultural Extension Service.

A handwritten signature in black ink, reading "Coy A. Garrett". The signature is fluid and cursive, with the first name "Coy" being particularly prominent.

Coy A. Garrett
State Conservationist
Soil Conservation Service



Location of Cumberland and Hoke Counties in North Carolina.

Soil Survey of Cumberland and Hoke Counties North Carolina

By Berman D. Hudson, Soil Conservation Service

Fieldwork by Berman D. Hudson, Lloyd B. Hale, Garry R. Maynor, Larry T. Sink,
James Dunn, Richard D. Hinson, and Albert S. Mills,
Soil Conservation Service
United States Department of Agriculture, Soil Conservation Service
in cooperation with
North Carolina Department of Natural Resources and Community Development,
North Carolina Agricultural Research Service,
North Carolina Agricultural Extension Service,
United States Army,
Cumberland County Board of Commissioners, and
the Hoke County Board of Commissioners

General Nature of the Survey Area

This section gives general information concerning Cumberland and Hoke Counties. It discusses the history and economic development of the area. It then describes the physical environment—the climate and physiography, relief, and drainage.

The first soil survey of Cumberland County was published in 1925 (4), and the first soil survey of Hoke County was published in 1921 (13). This soil survey combines and updates the first survey of these counties and provides additional information.

History and Economic Development

Historians are not certain when the first European settlers arrived in the present Cumberland and Hoke Counties. It is known that a settlement called Choffengington was established by a group of Scottish highlanders in 1729. This early settlement was at the present site of Wade in Cumberland County (6).

Cumberland County was formed from part of Bladen County in 1754. It was named in honor of William Augustus, Duke of Cumberland, a son of King George II. By 1765 there were 866 taxable settlers in the county. This early census included a few settlers in the remote western section of the county, which was later to form part of Hoke County. The county seat of Cumberland County is Fayetteville.

For about 150 years, what is now Hoke County was part of Cumberland and Robeson Counties. This sparsely settled area showed little development until the beginning of the twentieth century. In 1911 this area became Hoke County. The county seat is Raeford. Hoke County was named in honor of Confederate Army General Robert F. Hoke. After becoming independent, Hoke County made rapid progress in transportation, education, and economic development.

Agriculture has long been vital to the economy of the survey area. Tobacco, an important crop since early times, remains the leading source of farm income today. Soybeans, corn, livestock, and truck crops are other important sources of farm income.

The establishment of Fort Bragg as a permanent army post in 1917 has been a long term boon to the local economy. Fort Bragg now occupies 130,000 acres in the northern parts of Cumberland and Hoke Counties. The military and civilian work force there account for the single largest payroll in North Carolina. The entertainment and service industries resulting from this payroll have been largely responsible for Fayetteville's emergence as an important regional trade center.

Manufacturing industries are becoming increasingly important to the local economy. Industrial plants in the survey area turn out such diverse products as farm chemicals, clothing, small tools and appliances, automobile tires, and synthetic fibers.

This survey area is in the Coastal Plain Physiographic Province. Cumberland County has a land area of 423,040 acres, or 661 square miles. Hoke County has a land area of 243,840 acres, or 381 square miles. The survey area is bounded on the north by Moore and Harnett Counties, on the east by Sampson County, on the south by Bladen and Robeson Counties, and on the west by Scotland County.

The population of the survey area was 164,774 in 1960: 148,418 people were in Cumberland County, and 16,356 people were in Hoke County. By 1970 the population had increased dramatically. Most of this increase was caused by urbanization in Cumberland County. The population of Cumberland County grew from 148,418 to 212,042 between 1960 and 1970, an increase of 43 percent. Until recently, Hoke County had not experienced similar growth. Residential development is now accelerating in the eastern part of Hoke County.

Cumberland and Hoke Counties have good road systems. The survey area is served by one commercial airport, Grannis Field in Fayetteville, and four railroads. The Cape Fear River was once a major means of transportation. Although capable of handling barge traffic from its mouth near Wilmington to Fayetteville, the Cape Fear River is no longer used extensively for commerce or general transportation.

Climate

Prepared by the National Climatic Center, Asheville, N.C.

The Cumberland and Hoke Counties survey area is hot and generally humid in summer because of the moist, maritime air. Winter is moderately cold but short because the mountains to the west protect the area from many cold waves. Precipitation is quite evenly distributed throughout the year and is adequate for all crops.

Table 1 gives data on temperature and precipitation for the survey area as recorded at Fayetteville and Pinehurst, North Carolina, in the period 1951 to 1973. Table 2 shows probable dates of the first freeze in fall and the last freeze in spring. Table 3 provides data on length of the growing season.

In winter the average temperature at Fayetteville and Pinehurst is 44 and 43 degrees F, respectively. The average daily minimum temperature is 31 degrees at Fayetteville and 32 degrees at Pinehurst. The lowest temperature on record, which occurred at Pinehurst on December 13, 1962, is 3 degrees. In summer the average temperature is 78 degrees at Fayetteville and 77 degrees at Pinehurst. The average daily maximum temperature is 89 degrees. The highest recorded temperature, which occurred at Fayetteville on June 28, 1952, and at Pinehurst on July 23, 1952, is 105 degrees.

Growing degree days are shown in table 1. They are equivalent to "heat units." During the month, growing degree days accumulate by the amount that the average temperature each day exceeds a base temperature (50

degrees F). The normal monthly accumulation is used to schedule single or successive plantings of a crop between the last freeze in spring and the first freeze in fall.

The total annual precipitation is 43 inches at Fayetteville and 46 inches at Pinehurst. Of this, 60 percent usually falls in April through September, which includes the growing season for most crops. The heaviest 1-day rainfall during the period of record was 5.12 inches at Fayetteville on September 12, 1960, and 7.12 inches at Pinehurst on October 15, 1954. Thunderstorms occur on about 45 days each year, and most are in summer.

The average seasonal snowfall is 3 inches at Fayetteville and 5 inches at Pinehurst. The greatest snow depth at any one time during the period of record was 4 inches at Fayetteville and 8 inches at Pinehurst. On an average of 1 day, at least 1 inch of snow is on the ground. The number of such days varies greatly from year to year.

In winter, every few years, heavy snow covers the ground for a few days to a week. Every few years, in late summer or autumn, a tropical storm moving inland from the Atlantic Ocean causes extremely heavy rain for 1 to 3 days.

The average relative humidity in midafternoon is about 60 percent. Humidity is higher at night, and the average at dawn is about 85 percent. The sun shines 70 percent of the time possible in summer and 60 percent in winter. The prevailing wind is from the southwest. Average windspeed is highest, 9 miles per hour, in spring.

Physiography, Relief, and Drainage

The geology of the survey area can most simply be described as several layers of unconsolidated sediment underlain by bedrock composed of volcanic slate. The sediment generally is from 200 to about 400 feet deep; however, near McCain, in Hoke County, it is only 109 feet deep to the volcanic rock. The bedrock is not exposed anywhere in the survey area; therefore, soil formation has taken place entirely in the overlying sediment (3,5,7).

The survey area is in two major physiographic regions—the Sandhills and the Coastal Plain. The northern part of Hoke County and the northwestern part of Cumberland County are in the Sandhills region. The remainder of each county is in the Coastal Plain region.

Elevation in the Sandhills region ranges from about 270 feet above sea level to more than 500 feet above sea level. The highest point, 527 feet above sea level, is near McCain, in Hoke County. The Sandhills are characterized by broad, sandy ridges and long, less sandy side slopes. Many streams have cut deeply into the sediment. As a result, uplands tend to drain rapidly, even during extended wet periods. The overall slope of

the Sandhills area is to the south and east. The average decrease in elevation is about 25 feet per mile.

Elevation in the Coastal Plain region ranges from less than 100 feet above sea level in the southern and eastern parts of the survey area to about 270 feet above sea level in the northern and western parts. The Coastal Plain is gently undulating. Stream systems are not as extensive as in the Sandhills, and they usually have fewer tributaries. Also, streams in the Coastal Plain have not cut as deeply into the sediment as they have in the Sandhills. As a result of all of these factors, the overall drainage in the Coastal Plain is poorer than that of the Sandhills. Areas near the center of broad ridges may drain slowly after heavy rains or have a permanent high water table.

The most striking geologic features in the survey area are the Carolina bays, oval depressions ranging in size from less than an acre to more than 1,000 acres. The long axes of these bays are oriented in a northwest-southeast direction. A sandy rim is on the southeastern end of each bay. In general, the larger the bay, the sandier and more pronounced the rim. Unless artificially drained, soils in most bays are wet throughout the year. The largest bays are in the southeastern part of Cumberland County. Despite years of scientific inquiry and debate, no one really knows how the Carolina bays were formed.

Another important surficial feature is the terrace along the Cape Fear River. This terrace was formed by the river as it meandered across the landscape over a period of many centuries. The landscape is characterized by old abandoned river channels, point bars, and long, narrow ridges of sediment. The area reshaped by the river is a strip that is approximately 5 to 8 miles wide and runs in a north-south direction through the middle of Cumberland County. The river has now become entrenched and is in a narrow, winding channel more than 40 feet below the original terrace. This entrenchment has created steep bluffs along the river. The bluffs are now dissected by numerous ravines. These steep bluffs and deep, shady ravines support vegetation that is reminiscent of the cool mountains. For example, such species as beech, maple, American hornbeam, eastern hophornbeam, pawpaw, and serviceberry are common.

How This Survey Was Made

Soil scientists made this survey to learn what soils are in the survey area, where they are, and how they can be used. They observed the steepness, length, and shape of slopes; the size of streams and the general pattern of drainage; and the kinds of native plants or crops. They dug many holes to study soil profiles. A profile is the sequence of natural layers, or horizons, in a soil. It extends from the surface down into the parent material,

which has been changed very little by leaching or by plant roots.

The soil scientists recorded the characteristics of the profiles they studied and compared those profiles with others in nearby counties and in more distant places. They classified and named the soils according to nationwide uniform procedures. They drew the boundaries of the soils on aerial photographs. These photographs show trees, buildings, fields, roads, and other details that help in drawing boundaries accurately. The soil maps at the back of this publication were prepared from aerial photographs.

The areas shown on a soil map are called map units. Most map units are made up of one kind of soil. Some are made up of two or more kinds. The map units in this survey area are described under "General soil map units" and "Detailed soil map units."

While a soil survey is in progress, samples of some soils are taken for laboratory measurements and for engineering tests. All soils are field tested to determine their characteristics. Interpretations of those characteristics may be modified during the survey. Data are assembled from other sources, such as test results, records, field experience, and state and local specialists. For example, data on crop yields under defined management are assembled from farm records and from field or plot experiments on the same kinds of soil.

But only part of a soil survey is done when the soils have been named, described, interpreted, and delineated on aerial photographs and when the laboratory data and other data have been assembled. The mass of detailed information then needs to be organized so that it can be used by farmers, woodland managers, engineers, planners, developers and builders, home buyers, and others.

Map Unit Composition

A map unit delineation on a soil map represents an area dominated by one major kind of soil or an area dominated by several kinds of soil. A map unit is identified and named according to the taxonomic classification of the dominant soil or soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural objects. In common with other natural objects, they have a characteristic variability in their properties. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of soils of other taxonomic classes. Consequently, every map unit is made up of the soil or soils for which it is named and some soils that belong to other taxonomic classes. These latter soils are called inclusions or included soils.

Most inclusions have properties and behavioral patterns similar to those of the dominant soil or soils in

the map unit, and thus they do not affect use and management. These are called noncontrasting (similar) inclusions. They may or may not be mentioned in the map unit descriptions. Other inclusions, however, have properties and behavior divergent enough to affect use or require different management. These are contrasting (dissimilar) inclusions. They generally occupy small areas and cannot be shown separately on the soil maps because of the scale used in mapping. The inclusions of contrasting soils are mentioned in the map unit descriptions. A few inclusions may not have been observed, and consequently are not mentioned in the descriptions, especially where the soil pattern was so complex that it was impractical to make enough

observations to identify all of the kinds of soils on the landscape.

The presence of inclusions in a map unit in no way diminishes the usefulness or accuracy of the soil data. The objective of soil mapping is not to delineate pure taxonomic classes of soils but rather to separate the landscape into segments that have similar use and management requirements. The delineation of such landscape segments on the map provides sufficient information for the development of resource plans, but onsite investigation to precisely define and locate the soil is needed to plan for intensive uses in small areas.

The section survey procedure explains specific procedures used to make this survey.

General Soil Map Units

The general soil map at the back of this publication shows broad areas that have a distinctive pattern of soils, relief, and drainage. Each map unit on the general soil map is a unique natural landscape. Typically, a map unit consists of one or more major soils and some minor soils. It is named for the major soils. The soils making up one unit can occur in other units but in a different pattern.

The general soil map can be used to compare the suitability of large areas for general land uses. Areas of suitable soils can be identified on the map. Likewise, areas where the soils are not suitable can be identified.

Because of its small scale, the map is not suitable for planning the management of a farm or field or for selecting a site for a road or building or other structure. The soils in any one map unit differ from place to place in slope, depth, drainage, and other characteristics that affect management.

Descriptions of Map Units in Cumberland County

Areas dominated by excessively drained to moderately well drained soils on highly dissected uplands

The soils in these three units make up about 39 percent of Cumberland County. They are on uplands. The major soils are Autryville, Blaney, Candor, Gilead, and Lakeland. They are nearly level to strongly sloping and excessively drained to moderately well drained.

1. Blaney-Gilead-Lakeland

Nearly level to moderately steep, well drained, moderately well drained, and excessively drained soils that have a brittle loamy or clayey subsoil or that are sandy throughout; on uplands

This unit is in the northern and western parts of Cumberland County. It is on long side slopes and broad ridges.

This unit makes up about 15 percent of Cumberland County. It is about 35 percent Blaney soils, 10 percent Gilead soils, 10 percent Lakeland soils, and 45 percent soils of minor extent. Minor soils in this unit are Vauluse, Candor, Dothan, and Fuquay soils on the uplands and Johnston soils along streams.

The gently sloping to strongly sloping, well drained Blaney soils are on side slopes. The surface layer is dark grayish brown loamy sand. The subsurface layer is light yellowish brown loamy sand. The subsoil is brownish yellow and reddish yellow sandy clay loam. It is firm and brittle when dry.

The gently sloping to moderately steep, moderately well drained Gilead soils are on side slopes. Areas of Gilead soils frequently are intermingled with areas of Blaney soils. Gilead soils have a surface layer of dark gray loamy sand. The subsurface layer is light yellowish brown loamy sand. The upper part of the subsoil is brownish yellow sandy clay. The middle part of the subsoil is mottled strong brown, brownish yellow, and light gray sandy clay. The upper and middle parts are firm and brittle when dry. The lower part of the subsoil is reddish yellow and light yellowish brown sandy loam.

The nearly level to sloping, excessively drained Lakeland soils are on broad ridges. The surface layer is dark gray sand, and the underlying layers are yellowish brown, strong brown, reddish yellow, brownish yellow, or yellow sand.

More than 50 percent of this unit is on the Fort Bragg Military Reservation. The soils have sparse vegetative cover, have good trafficability, and dry out rapidly following rain.

Wooded areas are managed for wildlife and timber production. A few wooded areas have been cleared to grow corn, soybeans, and tobacco or are used for pasture.

The Blaney and Gilead soils are suited to woodland. The Lakeland soils are poorly suited because of droughtiness. Productivity is low on Blaney and Lakeland soils. Woodland use and management, however, has few significant limitations. Longleaf and loblolly pines are the dominant species. Construction of roads and firebreaks in wooded areas causes serious erosion.

Blaney and Gilead soils are suited to cultivated crops, such as corn and soybeans. Lakeland soils are poorly suited. Droughtiness is the main limitation on Blaney and Lakeland soils. Susceptibility to erosion is a limitation on Gilead soils.

Blaney and Gilead soils are well suited to such grasses as Coastal bermudagrass and bahiagrass for hay and pasture. Lakeland soils are poorly suited because of droughtiness.

This unit is suited to most urban and recreational uses. All the major soils have limitations for onsite sewage disposal. Blaney soils have slow permeability; Gilead soils have slow permeability and are wet; and Lakeland soils, because of rapid permeability, may not filter effluent properly.

2. Lakeland-Candor-Blaney

Nearly level to strongly sloping, excessively drained to well drained soils which are sandy throughout or have a loamy subsoil that may be brittle; on uplands

This unit is in the southwestern part of Cumberland County, generally in the vicinity of Hope Mills. It is on broad ridges and long side slopes.

This unit makes up about 11 percent of Cumberland County. It is about 20 percent Lakeland soils, 15 percent Candor soils, 15 percent Blaney soils, and 50 percent soils of minor extent. Minor soils in this unit are Wagram, Gilead, and Vacluse soils on the uplands and Johnston soils along streams.

The nearly level to sloping, excessively drained Lakeland soils are on broad ridges. The surface layer is dark gray sand, and the underlying layer is yellowish brown, strong brown, reddish yellow, brownish yellow, or yellow sand.

The nearly level to sloping, somewhat excessively drained Candor soils are on broad ridges. Areas of Candor soils frequently are intermingled with areas of Lakeland soils. The surface layer is grayish brown sand. The subsurface layer is yellowish brown sand. The subsoil is yellowish brown loamy sand. Below the subsoil is brownish yellow sand over strong brown sandy clay. This clay is mottled with light gray and yellowish red.

The gently sloping to strongly sloping, well drained Blaney soils are on side slopes. The surface layer is dark grayish brown loamy sand. The subsurface layer is light yellowish brown loamy sand. The subsoil is brownish yellow and reddish yellow sandy clay loam. It is firm and brittle when dry.

This unit is being urbanized at a rapid rate. Some areas, however, are in cultivated crops or woodland.

Candor and Lakeland soils on ridges are suited to most urban and recreational uses. Because of droughtiness, lawns and shrubs require irrigation and frequent applications of lime and fertilizer. The brittle subsoil of Blaney soils, which is on side slopes, may limit onsite sewage disposal. Proper location of septic tank absorption fields is important in this map unit.

Blaney soils are suited to growing cultivated crops. Lakeland and Candor soils are poorly suited. Blaney soils are well suited to pasture. Candor soils are suited to this use, and Lakeland soils are poorly suited. Droughtiness is the main limitation.

Blaney and Candor soils are suited to woodland, but the Lakeland soils are poorly suited to this use. Droughtiness is the main limitation.

3. Autryville-Candor

Nearly level to strongly sloping, well drained and somewhat excessively drained soils that have a loamy subsoil or are sandy throughout; on uplands

This unit is in the eastern part of Cumberland County along South River. It is on broad ridges and short side slopes.

This unit makes up about 13 percent of Cumberland County. It is about 30 percent Autryville soils, 25 percent Candor soils, and 45 percent soils of minor extent. Minor soils in this unit are Lakeland, Wagram, Norfolk, and Rains soils.

The nearly level, well drained Autryville soils are on broad ridges. The surface layer is dark grayish brown loamy sand. The subsurface layer is light yellowish brown loamy sand. The subsoil is yellowish brown sandy loam. The underlying material is brownish yellow sand or sandy loam.

The nearly level to strongly sloping, somewhat excessively drained Candor soils are on broad ridges and side slopes. The surface layer is grayish brown sand. The subsurface layer is yellowish brown sand. The subsoil is yellowish brown loamy sand. Below the subsoil is brownish yellow sand over strong brown sandy clay. This sandy clay is mottled with light gray and yellowish red.

Most of the Autryville and Candor soils are used to grow cultivated crops. There are a few large pine plantations. Except for scattered single family dwellings, urban development is insignificant.

Autryville soils in this unit are suited to cultivated crops. Candor soils are poorly suited to this use. Both of these soils are suited to pasture. Droughtiness and the leaching of plant nutrients are the main limitations.

These soils are suited to such trees as loblolly and longleaf pine. Droughtiness is the main limitation.

Autryville and Candor soils are suited to most urban and recreational uses. The rapid permeability of Candor soil is a limitation to onsite sewage disposal.

Areas dominated by well drained, moderately well drained, and poorly drained soils that are on broad, smooth uplands

The soils in these four units make up about 28 percent of Cumberland County. They are on uplands. The major soils are Exum, Faceville, Goldsboro, Grantham, Norfolk, Rains, and Wagram. They are nearly level to gently sloping and well drained, moderately well drained, and poorly drained.

4. Norfolk-Wagram-Rains

Nearly level to gently sloping, well drained and poorly drained soils that have a loamy subsoil; on uplands

This unit is in the southwestern part of Cumberland County. It consists of broad uplands and numerous, wet flats and depressions.

This unit makes up about 3 percent of Cumberland County. It is about 25 percent Norfolk soils, 20 percent Wagram soils, 10 percent Rains soils, and 45 percent soils of minor extent. Minor soils in this unit are Candor, Coxville, Dunbar, and Goldsboro soils on the uplands and Johnston soils along larger streams.

The nearly level to gently sloping, well drained Norfolk soils are on broad, smooth uplands. The surface layer is brown loamy sand. The subsurface layer is light yellowish brown loamy sand. The subsoil is yellowish brown sandy clay loam in the upper part and mottled brownish yellow, red, and pale brown sandy clay loam in the lower part.

The nearly level to gently sloping, well drained Wagram soils are on broad uplands. Areas of Wagram soils are frequently intermingled with areas of Norfolk soils. The surface layer is pale brown loamy sand. The subsurface layer is pale brown loamy sand. The subsoil is yellowish brown sandy clay loam.

The nearly level, poorly drained Rains soils are in shallow depressions and on low flats. They are below Norfolk and Wagram soils in the landscape. The surface layer is very dark gray sandy loam. The subsoil is gray sandy clay loam or sandy loam.

Most of this unit is used to grow such cultivated crops, as corn, soybeans, or tobacco. Many areas of the wetter soils remain in woodland.

Norfolk soils are well suited to growing cultivated crops and pasture. Wagram and Rains soils are suited. Droughtiness is a limitation of Wagram soils. Wetness is a limitation of Rains soils. Susceptibility to erosion is a limitation in the more sloping areas of Norfolk soils.

Norfolk and Rains soils are well suited to such trees as loblolly pine. Wagram soils are suited to this use.

Norfolk soils are well suited to urban and recreational uses. Wagram soils are well suited to urban uses and are suited to recreation. Rains soils are poorly suited to most urban and recreational uses. Wetness is the main limitation of these soils.

5. Wagram-Faceville-Norfolk

Nearly level to gently sloping, well drained soils that have a loamy or clayey subsoil; on uplands

This unit is in the western part of Cumberland County between Rockfish Creek and the Fort Bragg Military Reservation. It is on broad uplands, in areas frequently a mile or more wide, and on short, steep side slopes above streams.

This unit makes up about 12 percent of Cumberland County. It is about 30 percent Wagram soils, 10 percent Faceville soils, 10 percent Norfolk soils, and 50 percent soils of minor extent. The minor soils in this unit are mostly Candor and Goldsboro soils on upland ridges,

Blaney and Vaucluse soils on side slopes, and Johnston soils along streams.

The nearly level to gently sloping Wagram soils frequently are on the highest part of broad uplands. The surface layer is grayish brown loamy sand, and the subsurface layer is pale brown loamy sand. The subsoil is yellowish brown sandy clay loam.

The nearly level to gently sloping Faceville soils frequently are below Wagram soils in the landscape. The surface layer is grayish brown loamy sand. The subsurface layer is pale brown loamy sand. The subsoil is yellowish red sandy clay.

The nearly level to gently sloping, well drained Norfolk soils frequently are below Wagram soils in the landscape. The surface layer of Norfolk soil is brown loamy sand. The subsurface layer is light yellowish brown loamy sand. The subsoil is yellowish brown sandy clay loam in the upper part and mottled brownish yellow, red, and pale brown sandy clay loam in the lower part.

This unit is used mostly for crops or urban development. Open areas are being developed at a rapid rate. The areas used for cultivated crops are in corn, soybeans, and tobacco.

These soils are well suited to most urban uses. Faceville and Norfolk soils are well suited to recreational uses, and Wagram soils are suited. The sandy surface layer is the main limitation. Small scattered areas of wet soils, typically in oval depressions, have severe limitations for onsite sewage disposal. In areas where the subsoil is brittle the soil may be limited for onsite sewage disposal. These areas are intermittent on side slopes above streams. Proper location of septic tank absorption fields is important in this map unit.

Faceville and Norfolk soils are well suited to growing cultivated crops and to pasture, and Wagram soils are suited to these uses. Droughtiness is the main limitation on Wagram soils. Susceptibility to erosion is the main limitation in the more sloping areas of Faceville and Norfolk soils.

Norfolk soils are well suited to such trees as loblolly pine, and Faceville and Wagram soils are suited. Droughtiness is a limitation on Wagram soils.

6. Goldsboro-Grantham-Exum

Nearly level, moderately well drained and poorly drained soils that have a loamy subsoil; on uplands

This unit is in the eastern part of Cumberland County. It consists of broad uplands and numerous, wet flats and depressions.

This unit makes up about 8 percent of Cumberland County. It is about 18 percent Goldsboro soils, 15 percent Grantham soils, 15 percent Exum soils, and 52 percent soils of minor extent. Minor soils in this unit are Aycock, Lynchburg, Norfolk, Nahunta, and Rains soils on uplands and Johnston soils along streams.

The major soils in this unit are on broad uplands. Exum soils frequently are above Grantham soils in the landscape. Goldsboro soils rarely are in the same position on the landscape as the Grantham and Exum soils.

The moderately well drained Goldsboro soils have a surface layer of dark grayish brown loamy sand. The upper part of the subsoil is yellowish brown sandy clay loam that has gray mottles below a depth of 26 inches. The lower part of the subsoil is gray sandy clay loam or sandy loam.

The poorly drained Grantham soils have a surface layer of dark gray loam. The upper part of the subsoil is light gray silt loam. The lower part is light gray clay loam.

The moderately well drained Exum soils have a surface layer of grayish brown loam. The subsurface layer is light brownish gray loam. The subsoil is clay loam. The upper part of the subsoil consists of layers that are light yellowish brown, light olive brown, and yellowish brown. The lower part is mottled yellowish brown, gray, red, grayish brown, and light gray.

Most of this unit is used to grow cultivated crops, such as corn, soybeans, and tobacco. Many areas of the wetter soils remain in woodland.

Exum and Goldsboro soils are well suited to growing cultivated crops and to pasture, and Grantham soils are suited. Artificial drainage is needed for most crops, especially those that require drier soil, such as tobacco.

The major soils in this unit are well suited to such trees as loblolly pine.

Exum and Goldsboro soils are suited to most urban and recreational uses. Grantham soils are poorly suited to these uses. Wetness is the main limitation.

7. Norfolk-Goldsboro-Rains

Nearly level, well drained, moderately well drained, and poorly drained soils that have a loamy subsoil; on uplands

This unit is in the eastern part of Cumberland County. It consists of broad ridges, numerous flats, and depressions.

This unit makes up about 5 percent of Cumberland County. It is about 22 percent Norfolk soils, 18 percent Goldsboro soils, 15 percent Rains soils, and 45 percent soils of minor extent. Minor soils in this unit are Lynchburg, Torhunta, Aycock, Exum, Nahunta, and Grantham on uplands and Johnston along streams.

All of the major soils in this unit are on broad ridges. Norfolk soils usually are on the highest part of the landscape. Goldsboro soils are below Norfolk soils. Rains soils are below Goldsboro soils and are often in shallow depressions.

The well drained Norfolk soils have a surface layer of brown loamy sand. The subsurface layer is light yellowish brown loamy sand. The subsoil is yellowish brown sandy clay loam.

The moderately well drained Goldsboro soils have a surface layer of dark grayish brown loamy sand. The upper part of the subsoil is yellowish brown sandy clay loam that has gray mottles below a depth of 26 inches. The lower part of the subsoil is gray sandy clay loam.

The poorly drained Rains soils are in slight depressions on broad ridges. The surface layer is very dark gray sandy loam. The subsoil is gray sandy clay loam or sandy loam.

Most of this unit is used to grow cultivated crops, such as corn, soybeans, and tobacco. Many areas of the wetter soils remain in woodland.

Goldsboro and Norfolk soils are well suited to growing cultivated crops and to pasture. Rains soils are suited. Wetness is a limitation on Goldsboro and Rains soils. Susceptibility to erosion is a limitation in the more sloping areas of Norfolk soils.

These soils are well suited to such trees as loblolly pine.

Norfolk soils are well suited to most urban and recreational uses. Goldsboro soils are suited to these uses, but Rains soils are poorly suited. Wetness is the main limitation.

Areas dominated by poorly drained, well drained, and somewhat excessively drained soils on terraces

The soils in this unit make up about 19 percent of Cumberland County. They are on river terraces. The major soils are Roanoke, Wickham, and Tarboro soils. They are nearly level to gently sloping and poorly drained, somewhat excessively drained, and well drained.

8. Roanoke-Wickham-Tarboro

Nearly level to gently sloping, poorly drained, well drained, and somewhat excessively drained soils that have a loamy or clayey subsoil or are sandy throughout; on river terraces

This unit is on terraces along the Cape Fear River, which flows in a north-south direction through the middle of Cumberland County. These terraces are 4 to 5 miles wide. They consist of many narrow bands of sediment deposited by the meandering river.

This unit makes up about 19 percent of Cumberland County. It is about 20 percent Roanoke soils, 18 percent Wickham soils, 10 percent Tarboro soils, and 52 percent soils of minor extent. Minor soils in this unit are Altavista, Dogue, Cape Fear, Deloss, Chewacla, and Wahee soils.

The nearly level, poorly drained Roanoke soils are below Wickham and Tarboro soils in the landscape. Roanoke soils have a surface layer of grayish brown loam. The subsoil is light brownish gray clay loam in the upper part and gray to dark gray clay in the lower part. The underlying material is light gray loamy sand.

The nearly level and gently sloping, well drained Wickham soils are above Roanoke soils and below

Tarboro soils on the landscape. The surface layer is dark brown fine sandy loam. The subsoil is red sandy clay loam in the upper part and yellowish red sandy clay loam in the lower part. The underlying material is yellowish red and strong brown sand and loamy sand.

The nearly level and gently sloping, somewhat excessively drained Tarboro soils are on the highest parts of the landscape. The surface layer is dark brown loamy sand. The underlying material is strong brown, brownish yellow, and yellow sand.

Most areas of Wickham and Tarboro soils are used to grow cultivated crops. Although some areas have been cleared and drained, most areas of Roanoke soils remain in native hardwoods and pines.

Wickham soils are well suited to growing cultivated crops, Roanoke soils are suited, and Tarboro soils are poorly suited. Artificial drainage is needed in Roanoke soils for optimum production. Susceptibility to erosion is a limitation in the more sloping areas of Wickham soils. Droughtiness is a limitation on Tarboro soils. Roanoke and Wickham soils are well suited to growing grasses and legumes for hay and pasture, but Tarboro soils are poorly suited. Droughtiness is the main limitation.

Roanoke and Wickham soils are well suited to such trees as loblolly pine. Tarboro soils are suited to trees. Droughtiness is the main limitation.

Roanoke soils are poorly suited to urban and recreational uses because of flooding and wetness. Wickham and Tarboro soils are suited to most urban and recreational uses.

This unit contains many large homogeneous areas of one kind of soil. For example, there are broad ridges of either Tarboro or Wickham soils, and large, wet flats that contain mostly Roanoke soils. In some areas the soil pattern is very complex. Wickham or Tarboro soils are on narrow ridges that are dissected by numerous, parallel drainageways. Roanoke soils are along the drainageways. Use and management are made more complicated by this complex soil pattern.

Areas dominated by very poorly drained and somewhat excessively drained soils associated with large oval depressions in uplands

The soils in this unit make up about 12 percent of Cumberland County. They are on uplands in large Carolina bays, associated sandy rims, and broad, sandy ridges between bays. The major soils are Torhunta, Croatan, and Candor. They are nearly level and very poorly drained and somewhat excessively drained.

9. Torhunta-Croatan-Candor

Nearly level, very poorly drained soils that have a loamy subsoil or a thick, organic surface layer underlain by loamy material, and nearly level to gently sloping, somewhat excessively drained soils that are sandy throughout; on uplands

This unit is in the southeastern part of Cumberland County. It consists mostly of large Carolina bays, associated sandy rims, and broad sandy ridges between bays. The Carolina bays are oval depressions ranging from less than 1 acre to 1,000 acres in size.

This unit makes up about 12 percent of Cumberland County. It is about 20 percent Torhunta soils, 20 percent Croatan soils, 10 percent Candor soils, and 50 percent soils of minor extent. Minor soils in this unit are Kureb, Autryville, Leon, and Lynn Haven soils.

The very poorly drained Torhunta soils are on low flats or in oval depressions. The surface layer is black fine sandy loam. The subsurface layer is very dark gray fine sandy loam. The subsoil is dark gray and gray sandy loam. The underlying material is gray loamy sand.

The very poorly drained Croatan soils are in large Carolina bays. A typical profile consists of black organic material more than 18 inches thick. Dark gray sandy loam is below the organic layer.

The somewhat excessively drained Candor soils are mostly on sandy ridges between bays. The surface layer is grayish brown sand. The subsurface layer is yellowish brown sand. The subsoil is yellowish brown loamy sand. Below the subsoil is brownish yellow sand over strong brown sandy clay that is mottled with light gray and yellowish red.

Almost all of Torhunta or Croatan soils are in native woodland. These soils are in the Carolina bays. Some of the Candor and similar soils on sandy ridges are used for cultivated crops or pasture. Most of the acreage, however, is in woodland.

The major soils in this unit are poorly suited to growing cultivated crops. Croatan and Torhunta soils are poorly suited to pasture, and the Candor soils are suited. Wetness is the main limitation on both soils. Where artificially drained, these soils can be used for such crops as corn and soybeans. Drainage outlets often are not available. Droughtiness is the main limitation on Candor soils.

Torhunta soils are suited to such trees as loblolly pine. Wetness can limit equipment use during winter months and following heavy rains. Croatan soils are poorly suited to commercial timber production. Because of poor suitability for other uses, however, many areas of Croatan soils probably will remain in native woodland for many years. Species common to Croatan soils are pond pine, water tupelo, baldcypress, loblolly pine, sweetgum, swamp tupelo, and Atlantic white cedar. Candor soils are suited to trees. Droughtiness and low fertility may limit growth. There are no significant limitations for woodland use and management on Candor soils. Large undrained areas of Croatan and Torhunta soils provide good habitat for wetland wildlife.

Torhunta and Croatan soils are poorly suited to most urban and recreational uses. Wetness is the main limitation. Candor soils are suited to most urban and recreational uses.

Areas dominated by very poorly drained soils that are on flood plains

The soils in this unit make up about 2 percent of Cumberland County. They are on flood plains. The dominant soil is Johnston. It is nearly level and very poorly drained.

10. Johnston

Nearly level, very poorly drained soils that are loamy or sandy throughout; on flood plains

This unit is on broad flood plains along South River. It is in the eastern part of Cumberland County.

This unit makes up about 2 percent of Cumberland County. It is about 85 percent Johnston soils and 15 percent soils of minor extent. The minor soils in this unit are mostly Torhunta soils. Areas of Torhunta soils are intermixed with areas of Johnston soils on the flood plains.

Johnston soils have a surface layer of very dark gray loam. The underlying material is dark grayish brown and light brownish gray sandy loam and sand.

Almost all of this unit is in native woodland. Common species are baldcypress, water tupelo, and green ash. If undrained, this soil provides good habitat for wetland wildlife.

Johnston soils are well suited to growing such trees as loblolly pine, sweetgum, and yellow-poplar if the surface is adequately drained.

This unit is poorly suited to most agricultural, urban, or recreational uses. Wetness and flooding are the main limitations.

Descriptions of Map Units in Hoke County

Areas dominated by excessively drained to moderately well drained soils on highly dissected uplands

The soils in these three units make up about 67 percent of Hoke County. They are on uplands. The major soils are Autryville, Blaney, Candor, Gilead, and Lakeland. They are nearly level to strongly sloping and excessively drained to moderately well drained.

1. Blaney-Gilead-Lakeland

Nearly level to strongly sloping, well drained, moderately well drained, and excessively drained soils that have a brittle loamy or clayey subsoil or are sandy throughout; on uplands

This unit is in the northern part of Hoke County. It is on broad ridges and long side slopes.

This unit makes up about 60 percent of Hoke County. It is about 35 percent Blaney soils, 9 percent Gilead soils, 7 percent Lakeland soils, and 49 percent soils of minor extent. Minor soils in this unit are Vaucluse, Candor, Dothan, and Fuquay soils on the uplands and Johnston soils along streams.

The gently sloping to strongly sloping, well drained Blaney soils are on side slopes. The surface layer is dark grayish brown loamy sand. The subsurface layer is light yellowish brown loamy sand. The subsoil is brownish yellow and reddish yellow sandy clay loam. It is firm and brittle when dry.

The gently sloping to strongly sloping, moderately well drained Gilead soils are on side slopes. Areas of Gilead soils frequently are intermingled with areas of Blaney soils. The Gilead soils have a surface layer of dark gray loamy sand. The subsurface layer is light yellowish brown loamy sand. The upper part of the subsoil is brownish yellow sandy clay. The middle part of the subsoil is mottled strong brown, brownish yellow, and light gray sandy clay. The upper and middle parts are firm and brittle when dry. The lower part of the subsoil is reddish yellow sandy loam and light yellowish brown sandy loam.

The nearly level to sloping, excessively drained Lakeland soils are on broad ridges. The surface layer is dark gray sand, and the underlying layers are yellowish brown, strong brown, reddish yellow, brownish yellow, or yellow sand.

Over 65 percent of this unit is on the Fort Bragg Military Reservation. The soils have sparse vegetative cover, have good trafficability, and dry out rapidly following rain.

Wooded areas are managed for wildlife and timber production. A few wooded areas have been cleared to grow corn, soybeans, and tobacco or are used for pasture.

Blaney and Gilead soils are suited to woodland. Lakeland soils are poorly suited because of droughtiness. Productivity is low on Blaney and Lakeland soils. Woodland use and management, however, has few significant limitations. Longleaf and loblolly pines are the dominant species. Construction of roads and firebreaks in wooded areas causes serious erosion.

Blaney and Gilead soils are suited to growing cultivated crops, such as corn and soybeans. Lakeland soils are poorly suited. Droughtiness is the main limitation on Blaney and Lakeland soils. Susceptibility to erosion is a limitation on Gilead soils.

Blaney and Gilead soils are well suited to such grasses as Coastal bermudagrass and bahiagrass for hay and pasture. Lakeland soils are poorly suited because of droughtiness.

This unit is suited to most urban and recreational uses. All the major soils have limitations for onsite sewage disposal. Blaney soils have slow permeability; Gilead soils have slow permeability and are wet; Lakeland soils, because of rapid permeability, may not filter effluent properly.

2. Lakeland-Candor-Blaney

Nearly level to strongly sloping, excessively drained to well drained soils which are sandy throughout or have a loamy subsoil that may be brittle; on uplands

This unit is in a band, about 1 mile to 3 miles wide, along Rockfish Creek in Hoke County. It is on broad ridges and long hillsides.

This unit makes up about 5 percent of Hoke County. It is about 20 percent Lakeland soils, 15 percent Candor soils, 15 percent Blaney soils, and 50 percent soils of minor extent. Minor soils in this unit are Wagram, Gilead, and Vacluse soils on the uplands and Johnston soils along streams.

The nearly level to gently sloping, excessively drained Lakeland soils are on broad ridges. The surface layer is dark gray sand, and the underlying material is yellowish brown, strong brown, reddish yellow, brownish yellow, or yellow sand.

The nearly level to sloping, somewhat excessively drained Candor soils also are on broad ridges. Areas of Candor soils frequently are intermingled with areas of Lakeland soils. The surface layer is grayish brown sand. The subsurface layer is yellowish brown sand. The subsoil is yellowish brown loamy sand. Below the subsoil is brownish yellow sand that is over strong brown sandy clay. The sandy clay is mottled with light gray and yellowish red.

The gently sloping to strongly sloping, well drained Blaney soils are on side slopes. The surface layer is dark grayish brown loamy sand. The subsurface layer is light yellowish brown loamy sand. The subsoil is brownish yellow and reddish yellow sandy clay loam. It is firm and brittle when dry.

This unit is used mostly for urban development. Urbanization of the remaining open areas is proceeding at a rapid rate. Some areas are in cultivated crops or woodland.

Lakeland and Candor soils, on ridges, are suited to most urban and recreational uses. Because of droughtiness, lawns and shrubs require irrigation and frequent applications of lime and fertilizer. The brittle subsoil of Blaney soils, which are on side slopes, may limit onsite sewage disposal. Proper location of septic tank absorption fields is important in these areas.

Blaney soils are suited to cultivated crops. Lakeland and Candor soils are poorly suited. Blaney soils are well suited to pasture, and Candor soils are suited to pasture. Lakeland soils are poorly suited to this use. Droughtiness is the main limitation.

Blaney and Candor soils are suited to woodland, but the Lakeland soils are poorly suited to this use. Droughtiness is the main limitation.

3. Autryville-Candor

Nearly level to strongly sloping, well drained and somewhat excessively drained soils that have a loamy subsoil or that are sandy throughout; on uplands

This unit is in the southwestern part of Hoke County, along Lumber River. It is on broad ridges.

This unit makes up about 2 percent of Hoke County. It is about 30 percent Autryville soils, 25 percent Candor soils, and 45 percent soils of minor extent. Minor soils in this unit are Lakeland, Wagram, Norfolk, and Rains soils.

The nearly level, well drained Autryville soils are on broad ridges. The surface layer is dark grayish brown loamy sand. The subsurface layer is light yellowish brown loamy sand. The subsoil is yellowish brown sandy loam. The underlying material is brownish yellow sand or sandy loam.

The nearly level to strongly sloping, somewhat excessively drained Candor soils are on broad ridges and side slopes. The surface layer is grayish brown sand. The subsurface layer is yellowish brown sand. The subsoil is yellowish brown loamy sand. Below the subsoil is brownish yellow sand that is over strong brown sandy clay. The sandy clay is mottled with light gray and yellowish red.

Most of the major soils in this unit are used to grow cultivated crops. There are a few large pine plantations. Except for scattered single family dwellings, little significant urban development is in this unit.

Autryville soils are suited to growing cultivated crops. Candor soils are poorly suited. These soils are suited to pasture. Droughtiness and leaching of plant nutrients through the soils are the main limitations.

The major soils in this unit are suited to such trees as loblolly and longleaf pines. Droughtiness is the main limitation.

The major soils in this unit are suited to most urban and recreational uses. Rapid permeability is a limitation to onsite sewage disposal on Candor soils.

Areas dominated by well drained and poorly drained soils on broad, smooth uplands

The soils in these two units make up about 31 percent of Hoke County. They are on uplands. The major soils are Faceville, Norfolk, Rains, and Wagram. They are nearly level to gently sloping and well drained and poorly drained.

4. Norfolk-Wagram-Rains

Nearly level to gently sloping, well drained and poorly drained soils that have a loamy subsoil; on uplands

This unit is in the southern part of Hoke County. It is on broad ridges where wet flats and depressions are numerous.

This unit makes up 25 percent of Hoke County. It is about 25 percent Norfolk soils, 15 percent Wagram soils, 15 percent Rains soils, and 45 percent soils of minor extent. Minor soils in this unit are Candor, Coxville, Dunbar, and Goldsboro soils on the uplands and Johnston soils along larger streams.

The nearly level to gently sloping, well drained Norfolk soils are on broad, smooth uplands. The surface layer is brown loamy sand. The subsurface layer is light

yellowish brown loamy sand. The subsoil is yellowish brown sandy clay loam in the upper part and mottled brownish yellow, red, and pale brown sandy clay loam in the lower part.

The nearly level to gently sloping, well drained Wagram soils are on broad uplands. Areas of Wagram soils are frequently intermingled with areas of Norfolk soils. The surface layer is grayish brown loamy sand. The subsurface layer is pale brown loamy sand. The subsoil is yellowish brown sandy clay loam.

The nearly level, poorly drained Rains soils are in shallow depressions and on low flats. They are below Norfolk and Wagram soils in the landscape. The surface layer is very dark gray sandy loam. The subsoil is gray sandy clay loam or sandy loam.

Most of this unit is used to grow cultivated crops, such as corn, soybeans, and tobacco. Many areas of the wetter soils remain in woodland.

Norfolk soils are well suited to growing cultivated crops and to pasture. Wagram and Rains soils are suited. Droughtiness is a limitation on Wagram soils. Wetness is a limitation on Rains soils. Susceptibility to erosion is a limitation in the more sloping areas of Norfolk soils.

Norfolk and Rains soils are well suited to such trees as loblolly pine. Wagram soils are suited to this use.

Norfolk soils are well suited to urban and recreational uses. Wagram soils are well suited to urban uses and are suited to recreation. Rains soils are poorly suited to most urban and recreational uses. Wetness is the main limitation.

5. Wagram-Faceville-Norfolk

Nearly level to gently sloping, well drained soils that have a loamy or clayey subsoil; on uplands

This unit is in the eastern part of Hoke County, between Rockfish Creek and the Fort Bragg Military Reservation. It is on ridges, in areas frequently a mile or more wide, and on short side slopes above streams.

This unit makes up about 6 percent of Hoke County. It is about 30 percent Wagram soils, 10 percent Faceville soils, 10 percent Norfolk soils, and 50 percent soils of minor extent. Minor soils in this unit are Candor and Goldsboro soils on upland ridges, Blaney and Vacluse soils on side slopes, and Johnston soils along streams.

All the major soils in this unit are on broad ridges.

Wagram soils frequently are on the highest part of the landscape. The surface layer is grayish brown loamy sand. The subsurface layer is pale brown loamy sand. The subsoil is yellowish brown sandy clay loam.

Faceville soils frequently are below Wagram soils but are also on the highest part of the landscape. The surface layer is grayish brown loamy sand. The subsurface layer is pale brown loamy sand. The subsoil is yellowish red sandy clay.

Norfolk soils are also mostly below Wagram soils, but they are rarely near the Faceville soils. The surface layer

of the Norfolk soil is brown loamy sand. The subsurface layer is light yellowish brown loamy sand. The subsoil is yellowish brown sandy clay loam in the upper part and mottled brownish yellow, red, and pale brown sandy clay loam in the lower part.

This unit is used mostly for crops or urban development. Development of the open areas is proceeding at a rapid rate. The areas used for cultivated crops are in corn, soybeans, and tobacco.

The major soils of this unit are well suited to most urban uses. Faceville and Norfolk soils are well suited to recreational and the Wagram soils are suited to recreational uses. The sandy surface layer is the main limitation. Small scattered areas of wet soils, usually in oval depressions, have severe limitations for onsite sewage disposal. Areas where the subsoil is brittle, which occur intermittently, are on side slopes above streams. These areas also may be limited for onsite sewage disposal. Proper location of septic tank absorption fields is important in these areas.

Faceville and Norfolk soils are well suited to cultivation and Wagram soils are suited to cultivated crops and pasture. Droughtiness is the main limitation on Wagram soils. Susceptibility to erosion is the main limitation in the more sloping areas of Faceville and Norfolk soils.

Norfolk soils are well suited to such trees as loblolly pine. Faceville and Wagram soils are suited to this use. Droughtiness is a limitation on Wagram soils.

Areas dominated by very poorly drained soils that are on flood plains

The soils in this unit make up about 2 percent of Hoke County. They are on flood plains. The dominant soil is Johnston. It is nearly level and very poorly drained.

6. Johnston

Nearly level, very poorly drained soils that are loamy or sandy throughout; on flood plains

This map unit is on broad flood plains along the Lumber River. It is in the western part of Hoke County.

It makes up about 2 percent of Hoke County. It is about 85 percent Johnston soils and 15 percent soils of minor extent. The minor soil in this unit is mostly Torhunta soils. Areas of Torhunta soils are intermixed with areas of Johnston soils on the flood plains.

Johnston soil has a surface layer of very dark gray loam. The underlying material is dark grayish brown and light brownish gray sandy loam and sand.

Almost all of this unit is in native woodland. Common species are baldcypress, water tupelo, and green ash. If undrained, this soil provides good habitat for wetland wildlife.

This unit is well suited to such trees as loblolly pine, sweetgum, and yellow-poplar if adequate surface drainage is provided.

This unit is poorly suited to most agricultural, urban, or recreational uses. Wetness and flooding are the main limitations.

Detailed Soil Map Units

The map unit symbols on the detailed soil maps at the back of this survey represent the soils in the survey area. The map unit descriptions in this section, along with the soil maps, can be used to determine the suitability and potential of a soil for specific uses. They also can be used to plan the management needed for those uses. More information on each map unit, or soil, is given under "Use and Management of the Soils."

Each map unit on the detailed soil maps represents an area on the landscape and consists of one or more soils for which the unit is named.

All of the soils in the survey area formed in sediment of the Coastal Plain or in sediment deposited by streams flowing through the Coastal Plain.

A symbol identifying the soil precedes the map unit name in the soil descriptions. Each description includes general facts about the soil and gives the principal hazards and limitations to be considered in planning for specific uses.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer or of the underlying material, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer or of the underlying material. They also can differ in slope, wetness, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Norfolk loamy sand, 0 to 2 percent slopes, is one phase in the Norfolk series.

Some map units are made up of two or more major soils. These map units are called soil complexes or undifferentiated groups.

A *soil complex* consists of two or more soils in such an intricate pattern or in such small areas that they cannot be shown separately on the soil maps. The pattern and proportion of the soils are somewhat similar in all areas. Blaney-Urban land complex is an example.

An *undifferentiated group* is made up of two or more soils that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils in a mapped area are not uniform. An area can be made up of only one of the major soils, or it can be

made up of all of them. Torhunta and Lynn Haven soils is an undifferentiated group in this survey area.

Most map units include small scattered areas of soils other than those for which the map unit is named. Some of these included soils have properties that differ substantially from those of the major soil or soils. Such differences could significantly affect use and management of the soils in the map unit. The included soils are identified in each map unit description. Some small areas of strongly contrasting soils are identified by a special symbol on the soil maps.

This survey includes *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Urban land is an example. Miscellaneous areas are shown on the soil maps. Some that are too small to be shown are identified by a special symbol on the soil maps.

Table 4 gives the acreage and proportionate extent of each map unit. Other tables (see "Summary of tables") give properties of the soils and the suitabilities, limitations, and capabilities for many uses. The Glossary defines many of the terms used in describing the soils.

The soils in Fort Bragg and in remote parts of the survey area, such as the southeastern part of Cumberland County, are dominantly in woodland. In these areas the soils were examined mostly along canals, trails, and roads. In selected areas, transects were made across the land and borings were made at specific points to verify the soils. Soil boundaries were drawn from limited field observations, using aerial photographs and topographic maps as interpretation aids.

The soil maps of these remote areas show less detail than the maps of other parts of the survey area but meet the needs of the major anticipated users. These areas are used for timber production, wildlife habitat, recreation, watershed protection, and military purposes. If a more intensive use of the land is anticipated, an onsite, detailed evaluation should be made. If large areas of land are to be converted to residential use or to cropland, the area should be remapped to show more detail.

Soil Descriptions

AaA—Altavista fine sandy loam, 0 to 3 percent slopes. This moderately well drained soil is on terraces

along the Cape Fear and the Lower Little Rivers. It is in Cumberland County. Individual areas of this unit are irregular in shape and range from 5 to 25 acres in size.

Typically, the surface layer is grayish brown fine sandy loam 7 inches thick. The subsurface layer, 4 inches thick, is light yellowish brown fine sandy loam. The subsoil is 43 inches thick. The upper part of the subsoil is yellowish brown sandy clay loam that has gray mottles below a depth of 25 inches. The lower part is mottled red, yellowish brown, and gray sandy loam. The underlying material to a depth of 80 inches is brownish yellow sand that has light gray mottles.

Permeability is moderate, and available water capacity is medium. Reaction ranges from very strongly acid through medium acid in all horizons, except where the surface has been limed. The seasonal high water table is at a depth of 1.5 to 2.5 feet. This soil is subject to rare flooding.

Included with this soil in mapping are small areas of well drained Wickham soils; clayey Dogue soils; and clayey, somewhat poorly drained to poorly drained Wahee and Roanoke soils. Wickham soils are on narrow ridges. Areas of Dogue soils are intermixed randomly with areas of Altavista soil. Wahee and Roanoke soils are in shallow depressions and along drainageways. These included soils make up less than 15 percent of this unit.

About one-half of the acreage is cultivated or in pasture, and the other half is mostly in woodland. Small areas are in housing development or other urban uses.

This soil is well suited to growing cultivated crops, such as corn, soybeans, small grains, and tobacco. In some places, artificial drainage is needed for optimum growth of tobacco and other crops that require a drier soil. Rare flooding may occur for brief periods.

This soil is well suited to grasses or legumes. If this soil is used for pasture, proper stocking rates, pasture rotation, timely deferment of grazing, and restricted use during wet periods help keep the pasture and soil in good condition.

This soil is well suited to hardwoods and pines. The dominant trees are loblolly pine, sweetgum, white oak, water oak, and southern red oak. The main understory includes holly and sourwood. Wetness restricts the use of equipment and damages seedlings.

This soil is poorly suited to most urban uses because of wetness and possible flooding. It is suitable for recreational uses, but wetness may be a problem.

This soil is in capability subclass IIw and woodland suitability group 2w.

AuA—Autryville loamy sand, 0 to 2 percent slopes.

This well drained soil is on broad, smooth flats of uplands. It is most extensive in the eastern part of Cumberland County and the western part of Hoke County. Individual areas of this unit are irregular in shape and range from 5 to 400 acres in size.

Typically, the surface layer is dark grayish brown loamy sand 9 inches thick. The subsurface layer is light yellowish brown sand 16 inches thick. The subsoil is yellowish brown sandy loam 14 inches thick. The underlying material to a depth of 80 inches is brownish yellow sand or sandy loam.

Permeability is moderately rapid in the upper part of the subsoil and moderate in the lower part. Available water capacity is low. Reaction is very strongly acid or strongly acid throughout the soil, except where the surface has been limed. The water table is at a depth of 4 to 6 feet.

Included with this soil in mapping are a few areas of similar soils that have a sand or loamy sand surface layer less than 20 inches thick. Also included are small areas of more sandy Lakeland and Candor soils; less sandy Norfolk soils; wetter Stallings soils; and Wagram soils, which have a thicker subsoil. Typically, only two or three of these included soils are in any one delineation, and they make up less than 20 percent of this unit.

Most areas are cultivated, and the rest are mostly in woodland or pasture.

This soil is suited to growing cultivated crops, such as corn, soybeans, tobacco, peanuts, and small grains (fig. 1). Leaching of plant nutrients, wind erosion, and low available water capacity are the main limitations. Blowing sand may damage young plants. Winter cover crops, minimum tillage, and crop residue management help to maintain organic matter content and to conserve moisture. Conservation practices, such as no-till planting and windbreaks, and crop rotations that include close growing crops also help to conserve soil and water. Fertilizers, particularly nitrogen, should be added in split applications. The use of this soil for hay and pasture is effective in conserving soil and water. This soil is suited to growing forages, such as Coastal bermudagrass and bahiagrass.

This soil is suited to hardwoods and pines. The dominant trees are longleaf pine, loblolly pine, blackjack oak, and hickory. The main understory includes sassafras, dogwood, and turkey oak. The use of equipment and seedling mortality are the main limitations.

Autryville soil is suited to most urban uses. Lawns and shrubs may be difficult to establish and maintain because of the leaching of plant nutrients and droughtiness. Caving of ditch banks and trench walls and seepage are other problems for urban uses. This soil is suited to recreational uses. Sandy material is the main limitation.

This soil is in capability subclass IIs and woodland suitability group 3s.

AyB—Aycock loam, 1 to 4 percent slopes. This well drained soil is on broad, smooth flats of uplands. Most areas of this soil are east of the Cape Fear River in



Figure 1.—Autryville loamy sand, 0 to 2 percent slopes is suited to tobacco.

Cumberland County. Individual areas of this unit are irregular in shape and range from 5 to 30 acres in size.

Typically, the surface layer is dark grayish brown loam 9 inches thick. The subsurface layer is light yellowish brown loam 4 inches thick. The subsoil is 52 inches thick. It is yellowish brown clay loam that has light gray mottles in the lower part. The underlying material to a depth of 80 inches is mottled strong brown, light gray, and red clay.

Permeability is moderate, and available water capacity is high. Reaction is very strongly acid or strongly acid throughout the soil, except where the surface has been limed. The seasonal high water table is at a depth of 4 to 6 feet.

Included with this soil in mapping are small areas of the wetter, more clayey Duplin soils; wetter Exum soils; less silty Norfolk soils; and wetter, less silty Goldsboro soils. These included soils make up less than 20 percent of this unit.

Most areas of this soil are cultivated, and the rest are mainly in woodland and pasture.

This soil is well suited to growing cultivated crops, such as corn, soybeans, small grains, and cotton. Winter cover crops, minimum tillage, and crop residue management can help to control erosion and to maintain tilth. Field borders and crop rotations that include close-growing crops also help to conserve soil and water. This soil is well suited to grasses and legumes for pasture and hay.

This soil is well suited to hardwoods and pines. The dominant trees are loblolly pine, southern red oak, white oak, and hickory. The main understory includes dogwood, holly, sourwood, and sassafras.

Aycock soil is well suited to most urban and recreational uses.

This soil is in capability subclass IIe and woodland suitability group 2o.

BaB—Blaney loamy sand, 2 to 8 percent slopes.

This well drained soil is on side slopes and narrow ridges of uplands. It is mostly in the western and northern parts of Cumberland and Hoke Counties. Individual areas of this unit typically are in long, narrow bands above and parallel to most streams in the sandhills. They range from 10 acres to over 100 acres in size.

Typically, the surface layer is dark grayish brown loamy sand 4 inches thick. The subsurface layer is light yellowish brown loamy sand 21 inches thick. The subsoil, 37 inches thick, is brownish yellow sandy clay loam in the upper part and reddish yellow sandy clay loam in the lower part. The underlying material to a depth of 80 inches is yellow loamy coarse sand.

Permeability is moderately slow, and available water capacity is low. Reaction is very strongly acid or strongly acid throughout the soil, except where the surface has been limed. The hazard of erosion is moderate where the soil is exposed. A perched water table frequently is above the brittle subsoil for brief periods after heavy rains.

Included with this soil in mapping are small areas of more clayey Gilead soils, sandier Candor soils, and Vaucluse soils, which have a sandy surface layer less than 20 inches thick. These included soils make up less than 20 percent of this unit.

Most areas of this soil are in woodland, and the rest are mainly in row crops or pasture.

This soil is suited to growing cultivated crops, such as corn, soybeans, tobacco, and small grains. Winter cover crops, minimum tillage, and crop residue management help to conserve moisture. Conservation practices, such as no-till planting and windbreaks, and crop rotations that include close-growing crops also help to conserve soil and water. This soil is well suited to Coastal bermudagrass and bahiagrass. Erosion may be a hazard where runoff concentrates in cultivated fields.

This soil is suited to loblolly and longleaf pines. The understory is sassafras and blackjack oak. The brittle subsoil retards but does not restrict growth of tree roots.

This soil is suited to most urban and recreational uses. Recreational lakes frequently are made by damming streams flowing through areas of Blaney soils (fig. 2). Housing developments often surround these lakes.

Moderately slow permeability in the subsoil may limit the performance of septic tank absorption fields. The sandy surface layer is a limitation for some recreational uses.

This soil is in capability subclass IIIs and woodland suitability group 3s.

BaD—Blaney loamy sand, 8 to 15 percent slopes.

This well drained soil is on side slopes of uplands. It is mostly in the western and northern parts of Cumberland and Hoke Counties. Individual areas of this unit typically are in long, narrow bands above and parallel to most streams in the sandhills. They are 10 acres to over 100 acres in size.

Typically, the surface layer is dark grayish brown loamy sand 4 inches thick. The subsurface layer is light yellowish brown loamy sand 21 inches thick. The subsoil, 37 inches thick, is brownish yellow sandy clay loam in the upper part and reddish yellow sandy clay loam in the lower part. The underlying material to a depth of 80 inches is yellow loamy coarse sand.

Permeability is moderate, and available water capacity is low. Reaction is very strongly acid or strongly acid throughout the soil, except where the surface has been limed. The hazard of erosion is severe if the soil is exposed. A perched water table is frequently above the brittle subsoil for brief periods after heavy rains.

Included with this soil in mapping are a few areas of soils that have sandy material at a depth of less than 60 inches. Also included are small areas of more clayey Gilead soils, sandier Candor soils, and Vaucluse soils, which have a sandy surface layer less than 20 inches thick. These included soils make up less than 20 percent of this unit.

Most areas of this soil are in woodland, and a small acreage is in cultivated crops or pasture. Areas of this soil are being converted to urban uses in many parts of Cumberland and Hoke Counties.

This soil is poorly suited to growing cultivated crops. Steep slopes are susceptible to erosion. If used for row crops, contour cultivation, stripcropping, conservation tillage, and crop residue management help to reduce erosion. Using this soil for perennial hay and occasional row crops is a good conservation alternative. This soil is suited to grasses and legumes.

This soil is suited to loblolly and longleaf pines. The understory includes sassafras and blackjack oak. The brittle subsoil retards, but does not restrict, growth of tree roots. Care should be taken during tree planting and harvesting to reduce erosion in disturbed areas.

This soil is suited to most urban and recreational uses. Recreational lakes frequently are made by damming streams that flow through areas of Blaney soils. Slope and moderately slow permeability in the subsoil may limit the performance of septic tank absorption fields. The sandy surface layer and slope limit some recreational uses.

This soil is in capability subclass IVe and woodland suitability group 3s.



Figure 2.—A recreational lake in an area of Blaney loamy sand, 2 to 8 percent slopes.

BdB—Blaney-Urban land complex, 2 to 8 percent slopes. This map unit consists of areas of Blaney soil and areas of Urban land that are too small and too intermingled to be mapped separately. About 40 to 50 percent of the acreage is Blaney soil and about 30 to 40 percent is Urban land. This unit is most extensive in and around the city of Fayetteville. Most areas are irregular in shape and range from 10 to 200 acres in size.

Typically, Blaney soil has a surface layer of dark grayish brown loamy sand 4 inches thick. The subsurface layer is light yellowish brown loamy sand 21 inches thick. The subsoil, 37 inches thick, is brownish yellow sandy clay loam in the upper part and reddish yellow sandy clay loam in the lower part. The underlying material to a depth of 80 inches is yellow loamy coarse sand.

Permeability is moderately slow, and available water

capacity is low. Reaction is very strongly acid or strongly acid throughout the soil, except where the surface has been limed. The hazard of erosion is moderate where the soil is exposed. A perched water table frequently is above the brittle subsoil for brief periods after heavy rains.

Urban land consists of areas where the original soil has been covered by concrete, asphalt, buildings, or other impervious surfaces. Slope is modified to fit the site and commonly ranges from 0 to 4 percent.

Included with this unit in mapping are a few areas of Gilead soils, which are more clayey than Blaney soils. Also included are small areas of Candor soils, which contain more sand than is typical for this map unit. These included soils make up 10 to 20 percent of this unit.

Undeveloped areas of this map unit are being converted to urban uses very rapidly. Development frequently begins with the construction of a recreational lake. Houses are then built around the lake. This map unit is well suited to most urban and recreational uses. Moderately slow permeability in the subsoil may limit the performance of septic tank absorption fields. Irrigation and the applications of lime and fertilizers usually are required to establish and maintain such common lawn grasses as Coastal bermudagrass and centipede grass.

This soil has not been assigned to a capability subclass or woodland suitability group.

BdD—Blaney-Urban land complex, 8 to 15 percent slopes. This map unit consists of areas of Blaney soil and Urban land that are too small and too intermingled to be mapped separately. About 40 to 50 percent of the acreage is Blaney soil and about 30 to 40 percent is Urban land. This unit is most extensive in and around the city of Fayetteville. Mapped areas are 10 acres to more than 100 acres in size and are irregular in shape.

Blaney soil has a surface layer of dark grayish brown sand 4 inches thick. The subsurface layer is light yellowish brown loamy sand about 21 inches thick. The subsoil is 37 inches thick. It is brownish yellow sandy clay loam in the upper part and reddish yellow sandy clay loam in the lower part. The underlying material is yellow loamy coarse sand to a depth of 80 inches.

Permeability is moderate, and available water capacity is low. Reaction is very strongly acid or strongly acid throughout the soil, except where the surface has been limed. The hazard of erosion is severe where the soil is exposed. A perched water table is frequently above the brittle subsoil for brief periods after heavy rains.

Urban land consists of areas where the original soil has been covered by concrete, asphalt, buildings, or other impervious surfaces. Slope is modified to fit the site and commonly ranges from 0 to 4 percent.

Included with this unit in mapping are a few areas of Gilead soils, which are more clayey than Blaney soils. Also included are small areas of Candor soils, which

contain more sand than is typical for the map unit. These included soils make up 10 to 20 percent of the unit.

Undeveloped areas of this unit are being converted to urban uses very rapidly. Development frequently begins with the construction of a recreational lake. Then, houses are built around the lake. This map unit is suited to most urban and recreational uses. Moderately slow permeability in the subsoil may limit the performance of septic tank absorption fields. Irrigation and applications of lime and fertilizers usually are required to establish and maintain such common lawn grasses as Coastal bermudagrass and centipede grass. If a good cover of grass is not maintained, yards can erode. The sandy surface layer and slope limit some recreational uses.

This unit is not assigned to a capability subclass or woodland suitability group.

BrB—Bragg sandy loam, 1 to 4 percent slopes.

This well drained soil formed from material of the Coastal Plain and has been reshaped by man. It includes areas that have been excavated, graded, filled, and smoothed. Areas of this soil are most extensive on the Fort Bragg Military Reservation. Individual areas of this soil are irregular in shape and range from 5 to 60 acres in size.

Typically, the surface layer is strong brown sandy loam about 6 inches thick. The underlying material to a depth of 80 inches is strong brown, grayish brown, and gray sandy clay loam in the upper part; reddish yellow and yellowish red sandy clay loam and light yellowish brown sandy clay in the middle part; and light red sandy clay and very dark gray and brown loamy sand in the lower part.

Permeability is moderately slow to slow, and available water capacity is low. Reaction is very strongly acid or strongly acid, except where the surface has been limed. Some layers may be dense and brittle, especially clayey material which has been compacted.

Included with this soil in mapping are small areas of Blaney, Candor, Dothan, Fuquay, Gilead, Lakeland, Norfolk, and Vacluse soils. These included soils are relatively undisturbed. They may be covered with a thin layer of fill material or are cut to a shallow depth. Such inclusions make up less than 5 percent of most mapped areas.

Most areas of this soil are used for recreation or military purposes, which have required extensive soil alteration. It is unlikely that much acreage will be used for agriculture, woodland, or urban uses in the near future.

Bragg soil is suited to growing grasses, such as bahiagrass and Coastal bermudagrass. Susceptibility to erosion is the main limitation.

The dominant trees are loblolly pine and longleaf pine. The understory is mainly turkey oak. Low available water capacity is the main limitation.

Because this soil is highly variable, caution is advised when converting any areas to other uses. An onsite investigation of the soil is recommended in all such cases.

This soil is in capability subclass IIIe and woodland suitability group 4s.

BuA—Butters loamy sand, 0 to 2 percent slopes.

This well drained soil is on uplands. It is most extensive in the eastern part of Cumberland County. Individual areas of this unit are irregular in shape and range from 5 to 100 acres in size.

Typically, the surface layer is very dark grayish brown loamy sand about 9 inches thick. The subsoil, 36 inches thick, is yellowish brown sandy loam in the upper part and brownish yellow loamy sand in the lower part. The underlying material to a depth of 80 inches is brownish yellow sand in the upper part and brownish yellow sandy loam in the lower part.

Permeability is moderately rapid, and available water capacity is low. Reaction is strongly acid throughout the soil, except where the surface has been limed. The seasonal high water table is below a depth of 4 or 5 feet.

Included with this soil in mapping are a few areas of more sandy Candor and Autryville soils, less sandy Norfolk soils, and wetter Stallings soils. Typically, only two or three of these included soils are in any one delineation, and they make up less than 20 percent of most mapped areas.

Most areas of this soil are in row crops, and the rest are mostly in woodland.

Butters soil is well suited to growing cultivated crops, such as corn, soybeans, tobacco, peanuts, and small grains. Leaching of plant nutrients and low available water capacity are the main limitations. Minimum tillage, crop residue management, and winter cover crops reduce the leaching of plant nutrients and conserve moisture.

This soil is well suited to loblolly pine and longleaf pine. The dominant trees are loblolly pine, white oak, and southern red oak. The understory includes dogwood, holly, and sourwood.

Butters soil is suited to most urban uses. Wetness is the main limitation. This soil is well suited to recreation.

This soil is in capability subclass IIc and woodland suitability group 2o.

By—Byars loam. This nearly level, very poorly drained soil is on broad flats and in large oval depressions on uplands. It is most extensive in the southern parts of Cumberland and Hoke Counties. Mapped areas are broad and irregular in shape on the

flats and generally oval in the depressions. They range from 5 to 200 acres in size.

Typically, the surface layer, 18 inches thick, is loam that is black in the upper part and very dark gray in the lower part. The subsoil to a depth of 80 inches is very dark gray clay loam in the upper part and gray clay in the lower part.

Permeability is slow. Reaction is very strongly acid or strongly acid throughout the soil, except where the surface has been limed. The seasonal high water table is frequently at or near the surface during the winter and early spring. Ponding is common during periods of high or extended rainfall.

Included with this soil in mapping are small areas of better drained Coxville, McColl, and Rains soils and less clayey Pantego soils. These included soils make up less than 15 percent of most mapped areas.

Most areas of this soil are in woodland, and the rest are drained and used for cultivated crops.

Undrained or partially drained areas of this soil are poorly suited to growing cultivated crops, such as corn and soybeans. The main limitation is the high water table. Open ditch, subsurface drainage, or a combination of both help to lower the water table. If drained, this soil is suited to growing grasses and legumes for hay and pasture. If this soil is used for pasture, proper stocking rates, pasture rotation, timely deferment of grazing, and restricted use during wet periods help to keep the pasture and soil in good condition. Grazing when the soil is too wet can cause surface compaction and poor tilth.

This soil is well suited to hardwoods and pines. The dominant trees are loblolly pine, water oak, sweetgum, and maple. If this soil is drained, hardwoods, such as southern red oak and white oak, grow. The main understory includes greenbrier, holly, sweetbay, sourwood, sassafras, and giant cane. Wetness restricts the use of equipment.

This soil is poorly suited to all urban and recreational uses. Wetness and slow permeability are the main limitations.

This soil is in capability subclass VIw and woodland suitability group 2w.

CaB—Candor sand, 1 to 8 percent slopes. This somewhat excessively drained soil is in broad areas and, to a lesser extent, on rounded side slopes of uplands. Areas of this soil are widely distributed throughout the survey area. Individual areas are irregular in shape and range from 5 acres to more than 100 acres in size.

Typically, the surface layer is dark grayish brown sand 9 inches thick. The subsurface layer is yellowish brown sand about 11 inches thick. The subsoil, to a depth of 30 inches, is yellowish brown loamy sand. Between depths of 30 to 60 inches is brownish yellow sand. Below this to a depth of 80 inches is strong brown sandy clay loam mottled with light gray and yellowish red.

Permeability is moderate, and available water capacity is very low. Reaction ranges from extremely acid to medium acid in the surface layer and extremely acid to strongly acid in the subsoil. The hazard of erosion is moderate.

Included with this soil in mapping are small areas of less sandy Blaney, Fuquay, Wagram, and Autryville soils. Also included are small areas of more sandy Lakeland soils. Typically, no more than two or three of these included soils are in any mapped area. These included soils make up less than 20 percent of this unit.

Most areas of this soil are in cultivated crops or pasture, and the rest are mainly in woodland.

This soil is poorly suited to growing cultivated crops, such as corn, soybeans, peanuts, small grains, and truck crops. The main limitation is very low available water capacity. Minimum tillage, crop residue management, windbreaks, and close-growing grasses and legumes in the cropping system help to control soil blowing, to reduce leaching, and to conserve moisture. The soil is suited to pasture forage, such as Coastal bermudagrass and bahiagrass.

This soil is suited to loblolly pine and longleaf pine. The main understory is blackjack oak and turkey oak. The thick, sandy surface layer may limit equipment use.

This soil is suited to most urban and recreational uses. Lawns and shrubs may be difficult to establish and to maintain because of leaching of plant nutrients and droughtiness. Caving of ditch banks and trench walls and seepage are other management problems.

This soil is in capability subclass IIIs and woodland suitability group 3s.

CaD—Candor sand, 8 to 15 percent slopes. This moderately well drained soil is on side slopes of uplands. It is most extensive in the northern and western parts of Cumberland and Hoke Counties. Individual areas of this unit are usually narrow and long and range from 5 to 50 acres in size.

Typically, the surface layer is dark grayish brown sand 9 inches thick. The subsurface layer is yellowish brown sand about 11 inches thick. The subsoil, to a depth of 30 inches, is yellowish brown loamy sand. Between depths of 30 and 60 inches is brownish yellow sand. Below this to a depth of 80 inches is strong brown sandy clay loam mottled with light gray and yellowish red.

Permeability is moderate, and the available water capacity is very low. Reaction ranges from extremely acid to medium acid in the surface layer and extremely acid to strongly acid in the subsoil. The hazard of erosion is severe where the soil is exposed.

Included with this soil in mapping are small areas of the less sandy Wagram, Blaney, and Vacluse soils and sandier Lakeland soils. Typically, no more than two or three of these included soils are in any mapped area. They make up less than 20 percent of this unit.

Most areas of this soil are in woodland. The rest are mainly in pasture, except for a few areas that are in cultivated crops.

This soil is poorly suited to growing cultivated crops. The main limitations are slope and very low available water capacity. Minimum tillage, crop residue management, close-growing grasses and legumes in the cropping system, contour cultivation, and stripcropping help to control soil loss and to conserve moisture. This soil is suited to growing pasture forage, such as Coastal bermudagrass and bahiagrass.

This soil is suited to longleaf and loblolly pines. The main understory is blackjack oak and turkey oak. Slope and the thick sandy surface layer may limit equipment use.

This soil is suited to most urban and recreational uses. Slope and the thick sandy surface layer are the main limitations. Lawns and shrubs may be difficult to establish and to maintain because of leaching of plant nutrients and droughtiness. Caving of ditch banks and trench walls and seepage are other management problems.

This soil is in capability subclass IVs and woodland suitability group 3s.

Cf—Cape Fear loam. This nearly level, very poorly drained soil is on terraces of the Cape Fear and Lower Little Rivers and their tributaries. It is in Cumberland County. Individual areas of this unit generally are long and narrow. They range from 5 acres to more than 100 acres in size.

Typically, the surface layer is black loam 16 inches thick. The subsoil is 36 inches thick. The upper part is dark gray clay loam, the middle part is gray clay, and the lower part is light brownish gray sandy clay loam. The underlying material to a depth of 62 inches is light brownish gray sand.

Permeability is slow. Reaction ranges from very strongly acid through medium acid in all horizons, except where the surface has been limed. The seasonal high water table is at or near the surface during the winter and early spring. This soil is flooded rarely in some areas (fig. 3).

Included with this soil in mapping are small areas of better drained Roanoke and Wahee soils and less clayey Deloss soils. These included soils make up less than 15 percent of most mapped areas.

Most areas of this soil are in woodland. A few small areas have been cleared for crops or pasture.

If drained, this soil is suited to growing cultivated crops, such as corn, soybeans, and small grains. Open ditches are the most commonly used method of draining this soil.

This soil is suited to grasses and legumes for pasture or hay. If this soil is used for pasture, proper stocking rates, pasture rotation, timely deferment of grazing, and restricted use during wet periods help to keep the



Figure 3.—Soybean plants on Cape Fear loam have been damaged by flooding.

pasture and soil in good condition. Grazing when the soil is too wet can cause surface compaction and poor tilth.

Cape Fear soil is well suited to hardwoods and pines. The dominant trees are yellow-poplar, sweetgum, blackgum, and water oak. The main understory includes ironwood, greenbrier, switchcane, and maple. Flooding restricts the use of equipment and injures seedlings.

This soil is poorly suited to urban and recreational uses. Wetness, flooding, slow permeability, and low strength are the main limitations.

This soil is in capability subclass VIw and woodland suitability group 1w.

Ch—Chewacla loam. This nearly level, somewhat poorly drained soil is on flood plains along the Cape

Fear and Lower Little Rivers in Cumberland County. Individual areas of this unit are long and narrow on benches above the river. They range from 5 acres to more than 200 acres in size.

Typically, the surface layer, 18 inches thick, is loam that is brown in the upper part and dark brown in the lower part. The subsoil to a depth of 64 inches is dark yellowish brown loam in the upper part, reddish brown clay loam in the middle part, and mottled brown and light brownish gray sandy clay loam in the lower part.

Permeability is moderate, and available water capacity is high. Reaction ranges from very strongly acid to slightly acid throughout. The seasonal high water table commonly is at a depth of 0.5 foot to 1.5 feet below the

surface during the winter and early spring. This soil is commonly flooded for brief periods.

Included with this soil in mapping are small areas of similar soils that are better drained. Small areas of sandier Tarboro soils are on narrow levees along the river. These included soils make up less than 15 percent of most mapped areas.

Most areas of this soil are in woodland. A small acreage has been cleared for pasture.

This soil is well suited to growing cultivated crops, such as corn and soybeans, if it is drained and protected from flooding. Since most areas of this soil are small and inaccessible, such significant modifications generally would not be economically feasible.

Chewacla soil is well suited to grasses and legumes. Artificial drainage is required for optimum production. If used for pasture, proper rotation and timely deferment of grazing during wet periods help to reduce compaction and to maintain tilth.

This soil is well suited to hardwoods and pines. The dominant trees are American sycamore, eastern cottonwood, sweetgum, yellow-poplar, water oak, and southern red oak. Most stands contain scattered loblolly pine. The understory includes hackberry and winged elm. Wetness is the main limitation.

This soil is poorly suited to most urban and recreational uses. Wetness, flooding, and low strength are the main limitations.

This soil is in capability subclass IVw and woodland suitability group 1w.

Co—Coxville loam. This nearly level, poorly drained soil is on broad, smooth flats and in shallow depressions on uplands. It is most extensive in the southern part of Hoke County. Mapped areas generally are small and oval, but some large irregularly shaped areas are more than 40 acres in size.

Typically, the surface layer is dark gray loam 7 inches thick. The subsoil to a depth of 72 inches is gray sandy clay loam in the upper part, gray sandy clay or clay in the middle part, and light gray sandy clay in the lower part.

Permeability is moderately slow. Reaction is very strongly acid or strongly acid throughout the soil, except where the surface has been limed. The seasonal high water table is at or near the surface during the winter and early spring. Depressional areas of this soil may be ponded for brief periods after heavy rains.

Included with this soil in mapping are small areas of better drained Dunbar and Lynchburg soils, sandier Rains soils, and McColl soils, which have strong brown or yellowish brown brittle layers in the subsoil. Small areas of clayey soils that have a loamy or sandy layer at a depth of less than 60 inches are present in some mapped areas. These included soils make up 15 percent of the map unit.

Most areas of this soil are in row crops. The rest are mainly in woodland.

If drained, this soil is suited to growing cultivated crops, such as corn and soybeans. Coxville soil commonly is drained by parallel, open ditches. Even if the soil is drained, tillage can be delayed in the spring because of wetness. Minimum tillage, cover crops, and including grasses and legumes in the conservation cropping system help to maintain tilth.

This soil is well suited to hardwoods and pines. The dominant trees are loblolly pine, sweetgum, water oak, and American sycamore. The understory includes holly, switchcane, gallberry, and greenbrier. Equipment limitations can be expected if trees are planted or harvested during wet periods.

Because of wetness, moderately slow permeability, and low strength, this soil is poorly suited to most urban and recreational uses.

This soil is in capability subclass VIw and woodland suitability group 2w.

CrB—Craven loam, 1 to 4 percent slopes. This moderately well drained soil is on broad, smooth flats of uplands, mostly in the vicinity of Slocomb in Cumberland County. Individual mapped areas are irregular in shape and range from 5 acres to over 100 acres in size.

Typically, the surface layer is brown loam 7 inches thick. The subsoil, 37 inches thick, is yellowish brown clay that has gray mottles below a depth of 23 inches. The underlying material to a depth of 80 inches is gray clay in the upper part and gray clay loam in the lower part.

Permeability is slow or very slow, and available water capacity is high. Reaction is very strongly acid or strongly acid throughout the soil, except where the surface has been limed. The seasonal high water table is 2 to 3 feet below the surface during the winter and early spring.

Included with this soil in mapping are small areas of somewhat poorly drained Lenoir soils and less silty Duplin soils. These included soils make up less than 15 percent of most mapped areas.

Most areas of this soil are in woodland. A small acreage is cultivated.

Craven soil is well suited to growing cultivated crops, such as corn, soybeans, and small grains. Winter cover crops, minimum tillage, and crop residue management help to control erosion and to maintain tilth. Field borders and crop rotations that include close-growing crops also help to conserve soil and water. Water collects in low spots for brief periods after heavy rainstorms. Drainage may be necessary for optimum production of tobacco and other crops which require a drier soil. Using this soil for hay or pasture is a good conservation alternative. The soil is well suited to grasses and legumes.

This soil is suited to loblolly pine. The dominant trees are loblolly pine, sweetgum, yellow-poplar, and white oak. The main understory includes holly, sourwood, red maple, and dogwood. Wetness restricts the use of equipment and damages seedlings.

This soil is suited to most urban and recreational uses. Wetness and slow permeability are the main limitations. Erosion can be a problem on slopes if disturbed sites are not revegetated promptly.

This soil is in capability subclass IIIe and woodland suitability group 3w.

CT—Croatan muck. This nearly level, very poorly drained, organic soil is mostly in large, oval depressions or Carolina bays in the southeastern part of Cumberland County. Most areas of this unit have thick, almost impenetrable undergrowth; therefore, the soils were examined mostly along canals, trails, and logging roads. In selected areas, transects were made across the land, and borings were made at specific points to verify the soils. The boundaries of the soils were drawn from limited field observations, using aerial photographs as aids for interpretation. Although this unit was mapped with fewer detailed observations than were most other units in the survey, the resulting delineations meet the needs for the major anticipated uses of the soil. Individual areas of this unit range from 100 acres to more than 500 acres in size.

Typically, the soil is black muck to a depth of 37 inches. The underlying material to a depth of 80 inches is dark gray sandy loam.

Permeability is slow to moderately rapid. Where the soil is drained, permeability is moderate in the organic layer and moderate or moderately slow in the mineral layer. Reaction is extremely acid, except where the surface had been limed. Except where the soil is drained, the seasonal high water table is at or near the surface from 8 months to the full year.

Included with this soil in mapping are small areas of Johnston, Torhunta, Lynn Haven, and Leon soils. All of these are mineral soils. They typically are on the outer edges of oval-shaped delineations of Croatan soils. They may be in slightly elevated areas located randomly within mapped areas. Also included are small areas of similar soils that have an organic surface tier thinner than 16 inches or thicker than 51 inches. These soils are randomly intermingled with Croatan soil. Included soils make up less than 20 percent of most unit.

Most areas of this soil are in woodland. A small acreage has been cleared for growing corn and soybeans.

This soil is poorly suited to growing cultivated crops and to pasture. Wetness is the main limitation. If the soil is drained, corn and soybeans can be grown. Suitable drainage outlets, however, usually are unavailable. Wetness also limits the use of this soil for pasture or hay. Even with proper drainage, grazing probably would

be difficult during very wet periods when the organic surface layer becomes soggy.

Croatan soil is poorly suited to trees. Because the soil is poorly suited to other uses, many areas of it probably will remain in native woodland for many years. The dominant trees are pond pine, water tupelo, baldcypress, loblolly pine, sweetgum, swamp tupelo, and Atlantic white-cedar. The understory includes sweetbay, greenbrier, and gallberry. In its natural, undrained state, this soil provides good habitat for wetland wildlife.

This soil is poorly suited to most urban and recreational uses. Wetness and low strength are the main limitations.

This soil is in capability subclass VIIw and woodland suitability group 4w.

De—Deloss loam. This nearly level, very poorly drained soil is on terraces of the Cape Fear and Lower Little Rivers and their tributaries in Cumberland County. Individual areas of this unit generally are long and narrow and range from 10 acres to more than 200 acres in size.

Typically, the surface layer is black loam 10 inches thick. The subsurface layer is dark grayish brown loamy sand 3 inches thick. The subsoil to a depth of 72 inches is grayish brown, light brownish gray, and light gray sandy clay loam in the upper part and gray sandy loam in the lower part.

Permeability is moderate. Reaction ranges from very strongly acid through slightly acid in all horizons. The seasonal high water table is at or near the surface during the winter and early in spring. This soil is subject to rare flooding.

Included with this soil in mapping are small areas of better drained Roanoke and Wahee soils and more clayey Cape Fear soils. Also included are small areas of sandy soils that have thin subhorizons high in organic matter content. These sandy soils are on small, narrow, slightly elevated ridges that have distinctive, gray or white surfaces.

Several large areas of this soil have been cleared to grow corn and soybeans. The rest are in woodland.

This soil is suited to growing cultivated crops, such as corn, soybeans, and small grains. Good yields are common in areas of Deloss soil which have been properly drained and protected from flooding. Open ditches are the most common method used to drain this soil.

Deloss soil is well suited to grasses and legumes for hay and pasture. If this soil is used for pasture, proper stocking rates, pasture rotation, timely deferment of grazing, and restricted use during wet periods help to keep the pasture and soil in good condition. Grazing when the soil is too wet can cause surface compaction and poor tilth.

This soil is suited to hardwoods and pines. Water tupelo and sweetgum can be grown without artificial

drainage. Where this soil is properly drained, American sycamore and loblolly pine can be grown. The understory includes greenbrier, switchcane, and red maple. Equipment limitations can be expected if trees are harvested or planted during the winter or early spring.

Deloss soil is poorly suited to urban and recreational uses. Wetness and flooding are the main limitations.

This soil is in capability subclass VIw and woodland suitability group 3w.

DgA—Dogue fine sandy loam, 0 to 2 percent slopes. This moderately well drained soil is on terraces along the Cape Fear and Lower Little Rivers in Cumberland County. Individual areas of this unit are irregular in shape and range from 5 to 25 acres in size.

Typically, the surface layer is dark grayish brown fine sandy loam 4 inches thick. The subsoil is 51 inches thick. The upper part is light yellowish brown clay loam. The middle part is reddish yellow clay that has gray mottles. The lower part is mottled strong brown and light gray clay loam. The underlying material to a depth of 72 inches is strong brown sandy clay loam that has light gray mottles.

Permeability is moderately slow, and available water capacity is medium. Reaction ranges from extremely acid through strongly acid in all horizons, except where the surface has been limed. The seasonal high water table is 2 to 3 feet below the surface during winter and early spring. This soil is subject to rare flooding.

Included with this soil in mapping are small areas of better drained Wickham soils, less clayey Altavista soils, and wetter Wahee and Roanoke soils. Wickham soils are on narrow ridges. Areas of Altavista soils are intermixed randomly within areas of Dogue soil. Wahee and Roanoke soils are in shallow depressions and drainageways. These included soils make up less than 15 percent of most mapped areas.

Most areas of this soil are in woodland. The rest are mainly in row crops or pasture.

This soil is well suited to growing cultivated crops, such as corn, soybeans, and small grains. Artificial drainage is needed for optimum growth of tobacco and other crops that require a drier soil. Flooding may occur for brief periods.

Dogue soil is well suited to growing grasses or legumes. If this soil is used for pasture, proper stocking rates, pasture rotation, and restricted use during wet periods help to keep the pasture and soil in good condition.

This soil is well suited to hardwoods and pines. The dominant trees are loblolly pine, sweetgum, yellow-poplar, and white oak. The main understory includes holly, sourwood, red maple, and dogwood. Wetness restricts the use of equipment.

Dogue soil is poorly suited to most urban and recreational uses. Wetness, moderately slow permeability, and low strength are the main limitations.

This soil is in capability subclass IIw and woodland suitability group 2w.

DhA—Dothan loamy sand, 0 to 2 percent slopes. This well drained soil is on broad, smooth flats of uplands. It is in the northern and western parts of Cumberland and Hoke Counties. Individual areas of this unit are irregular in shape and range from 5 acres to more than 100 acres in size.

Typically, the surface layer is dark grayish brown loamy sand 7 inches thick. The subsurface layer is light yellowish brown loamy sand 4 inches thick. The subsoil to a depth of 72 inches is yellowish brown sandy clay loam.

Permeability is moderate in the upper part of the subsoil and moderately slow in the lower part. Permeability is reduced in the lower part of the subsoil by the large volume of plinthite. Available water capacity is medium. Reaction is very strongly acid or strongly acid throughout the soil, except where the surface has been limed. A perched water table is within 3 to 5 feet of the surface during wet periods.

Included with this soil in mapping are small areas of sandier Blaney and Fuquay soils; wetter Goldsboro soils; Norfolk soils, which do not have as much as 5 percent plinthite within 60 inches of the surface; and Gilead soils, which have a firm, brittle, clayey subsoil. These included soils make up less than 15 percent of most mapped areas.

Most areas of this soil are cultivated. The rest are in woodland.

Dothan soil is well suited to growing cultivated crops, such as corn, soybeans, tobacco, or small grains. There are no major limitations to this use. Minimum tillage, cover crops, and the use of close-growing grasses and legumes in the cropping system help to maintain tilth and to conserve moisture.

Dothan soil is well suited to grasses and legumes for pasture or hay. If this soil is used for pasture, proper rotation and prevention of overgrazing help to keep the forage and soil in good condition.

Dothan soil is well suited to loblolly pine. The dominant trees are loblolly pine, white oak, southern red oak, black oak, and hickory. The main understory includes holly, dogwood, persimmon, and sassafras.

This soil is suited to most urban uses. Wetness and moderately slow permeability are limitations for septic tank absorption fields. This soil is well suited to recreational uses.

This soil is in capability class I and woodland suitability group 2o.

Dn—Dunbar loam. This nearly level, somewhat poorly drained soil is on broad, smooth flats of uplands. It is

most extensive in the southern part of Hoke County and east of the Cape Fear River in Cumberland County. Individual areas of this unit are irregular or oval in shape and range from 5 acres to more than 100 acres in size.

Typically, the surface layer is dark grayish brown loam 3 inches thick. The subsurface layer is brown loam 7 inches thick. The subsoil to a depth of 72 inches is pale brown clay loam in the upper part and light gray and gray clay in the lower part.

Permeability is moderately slow, and available water capacity is medium to high. Reaction is very strongly acid or strongly acid throughout the soil, except where the surface has been limed. The seasonal high water table is from 1 foot to 2.5 feet of the surface during the winter and early spring.

Included with this soil in mapping are small areas of wetter Coxville and Rains soils, better drained Duplin soils, and less clayey Lynchburg soils. These included soils make up less than 15 percent of most mapped areas.

Most areas of this unit are in cultivated crops or pasture. The rest are mostly in woodland.

Dunbar soil is suited to growing cultivated crops, such as corn, soybeans, and small grains. Artificial drainage is needed for optimum production of crops that require a drier soil. Crop residue management can help to maintain tilth.

Dunbar soil is well suited to grasses or legumes. If this soil is used for pasture, proper stocking rates, pasture rotation, and restricted use during wet periods help to keep the pasture and soil in good condition.

This soil is well suited to hardwoods and pines. The dominant trees are maple, sweetgum, loblolly pine, willow oak, and water oak. The main understory includes switchcane, holly, sourwood, and greenbrier. Wetness from November to April can restrict the use of equipment and damage seedlings.

This soil is poorly suited to most urban and recreation uses. Wetness and moderately slow permeability are the main limitations.

This soil is in capability subclass IIw and woodland suitability group 2w.

DpA—Duplin sandy loam, 0 to 3 percent slopes.

This moderately well drained soil is on broad flats of uplands. It is most extensive in the southern part of Hoke County and to the east of the Cape Fear River in Cumberland County. Individual areas of this unit are irregular in shape and range from 5 to 100 acres in size.

Typically, the surface layer is dark gray sandy loam 3 inches thick. The subsurface layer is pale brown sandy loam 3 inches thick. The subsoil to a depth of 65 inches is yellowish brown sandy clay in the upper part; light yellowish brown sandy clay in the middle part; and mottled yellowish brown, yellowish red, and light brownish gray sandy clay in the lower part.

Permeability is moderately slow, and available water capacity is medium to high. Reaction is very strongly acid or strongly acid in all horizons, except where the surface has been limed. The seasonal high water table is within 2 to 3 feet of the surface during the winter and early spring.

Included with this soil in mapping are small areas of wetter Dunbar soils; less clayey Exum and Goldsboro soils; less clayey, wetter Lynchburg soils; and better drained, less clayey Norfolk soils. These included soils make up less than 15 percent of most mapped areas.

Most areas of this soil are used for cultivated crops or pasture. The rest are mainly in woodland.

Duplin soil is well suited to growing cultivated crops, such as corn, soybeans, small grains, and tobacco. Artificial drainage is needed in some areas for optimum growth of tobacco and other crops that require a drier soil. Crop residue management helps to maintain tilth.

This soil is well suited to grasses or legumes. If this soil is used for pasture, proper stocking rates, pasture rotation, and restricted use during wet periods help to keep the pasture and soil in good condition.

Duplin soil is well suited to hardwoods and pines. The dominant trees are maple, sweetgum, loblolly pine, willow oak, and water oak. The main understory includes switchcane, holly, sourwood, and greenbrier. Wetness from November to April can restrict the use of equipment.

This soil is poorly suited to most urban uses because of wetness, moderately slow permeability, and moderate shrink-swell potential. Wetness and permeability affect the performance of a septic tank absorption field if the soil is not properly drained. This soil is suited to recreation; however, wetness may be a problem.

This soil is in capability subclass IIw and woodland suitability group 2w.

DT—Dystrochrepts, steep. This well drained soil is on steep bluffs above the Cape Fear River and its major tributaries in Cumberland County. Although this unit was mapped with fewer detailed observations than were most other units in the survey, it meets the needs for the major anticipated uses. Individual areas of this unit are long and narrow and range from 25 acres to more than 200 acres in size. Slopes range from 15 to 60 percent.

These areas are highly variable in composition because of the stratification of sediment at various levels on these bluffs.

In a reference pedon, the surface layer is very dark, grayish brown loam about 2 inches thick. The subsoil is about 38 inches thick. It is strong brown sandy loam in the upper part and yellowish red sandy loam in the lower part. The underlying material to a depth of 72 inches is strong brown coarse sand in the upper part and strong brown gravel in the lower part.

Permeability is moderately rapid, and available water capacity is low. Reaction ranges from extremely acid

through strongly acid in all horizons. Surface runoff is rapid.

Except for very small areas cleared for pipelines or power lines, all areas of this soil are in woodland. Common trees are American beech, yellow-poplar, American sycamore, loblolly pine, sweetgum, and southern red oak. Common understory species include holly, American hornbeam, eastern hophornbeam, pawpaw, and serviceberry.

Dystrochrepts are poorly suited to all agricultural and urban uses. Although trees grow well on this soil,

harvesting timber would be difficult and could result in severe surface erosion and mass slippage of soil. Because of highly erodible, unstable slopes, most areas of this soil probably will remain undisturbed as scenic woodland and watershed protection (fig. 4).

This soil has not been assigned to a capability subclass or to a woodland suitability group.

ExA- Exum loam, 0 to 2 percent slopes. This nearly level, moderately well drained soil is on broad flats of uplands. Most areas of this soil are east of the Cape



Figure 4.—Soils mapped as Dystrochrepts, steep, are on bluffs along Cape Fear River.

Fear River in Cumberland County. Mapped areas are irregular in shape and range from 5 to 50 acres in size.

Typically, the surface layer is grayish brown loam 9 inches thick. The subsurface layer is light brownish gray loam 3 inches thick. The subsoil to a depth of 75 inches is light yellowish brown clay loam and light olive brown clay loam in the upper part; yellowish brown clay loam and mottled yellowish brown, gray, red, and grayish brown clay loam in the middle part; and mottled light gray, yellowish brown, and red clay loam in the lower part.

Permeability is moderate, and available water capacity is high. Reaction is very strongly acid or strongly acid throughout the soil, except where the surface has been limed. The seasonal high water table is 2 to 3 feet below the surface during the winter and early spring.

Included with this soil in mapping are small areas of better drained Norfolk and Aycock soils; less silty Goldsboro soils; more clayey Duplin soils; and wetter Nahunta, Dunbar, and Lynchburg soils. Also included are small areas of soils that have layers of sand or sandy loam at a depth of less than 60 inches. These included soils make up less than 20 percent of most mapped areas.

Most areas of this soil are cultivated. The rest are mainly in woodland or pasture.

Exum soil is well suited to cultivated crops, such as corn, soybeans, tobacco, small grains, and cotton. Artificial drainage is needed in some areas for optimum growth of tobacco and other crops that require a drier soil.

It is well suited to grasses or legumes. If this soil is used for pasture, proper stocking rates, pasture rotation, and restricted use during wet periods help to keep the pasture and soil in good condition.

Exum soil is well suited to hardwoods and pines. The dominant trees are loblolly pine, white oak, southern red oak, and red maple. The understory includes holly and sourwood. Wetness may limit the use of equipment.

This soil is suited to most urban and recreational uses. Wetness and low strength are the main limitations. Drainage may be necessary in many areas to ensure proper functioning of septic tank absorption fields.

This soil is in capability subclass IIw and woodland suitability group 2w.

FaA—Faceville loamy sand, 0 to 2 percent slopes.

This well drained soil is on broad, smooth flats of uplands. It is mostly in the western part of Cumberland County. Individual areas of this unit are irregular in shape and range from 5 acres to more than 200 acres in size.

Typically, the surface layer is grayish brown loamy sand 7 inches thick. The subsurface layer is pale brown loamy sand 10 inches thick. The subsoil to a depth of 70 inches is yellowish red sandy clay.

Permeability is moderate, and available water capacity is medium. Reaction is very strongly acid or strongly acid

throughout the soil, except where the surface has been limed.

Included with this soil in mapping are small areas of browner, less clayey Norfolk soils and sandier Wagram soils. These included soils make up less than 20 percent of most mapped areas.

Most areas of this soil are cultivated or in pasture, and a few areas are in woodland. These areas are being converted to urban use at a rapid rate.

Faceville soil is well suited to growing cultivated crops, such as corn, soybeans, small grains, tobacco, and truck crops. There are no major limitations of this soil for cultivated crops. Minimum tillage, cover crops, and the use of close-growing grasses and legumes in the cropping system help to maintain tilth and to conserve moisture.

Faceville soil is well suited to grasses and legumes. There are no limitations of this soil for pasture or hay. Proper rotation and prevention of overgrazing help to keep the pasture and soil in good condition.

This soil is suited to loblolly pine. The dominant trees are loblolly pine, southern red oak, white oak, black oak, and hickory. The main understory includes dogwood, holly, sassafras, and black cherry.

This soil is well suited to most urban uses. Moderate permeability may be a limitation for septic tank absorption fields. The soil is well suited to recreational uses.

This soil is in capability class I and woodland suitability group 3o.

FaB—Faceville loamy sand, 2 to 6 percent slopes.

This well drained soil is on convex ridges and smooth side slopes of uplands. Most mapped areas of this soil are in the western part of Cumberland County. Individual areas of this unit are irregular in shape and range from 5 acres to more than 100 acres in size.

Typically, the surface layer is grayish brown loamy sand 7 inches thick. The subsurface layer is pale brown loamy sand 10 inches thick. The subsoil to a depth of 70 inches is yellowish red sandy clay.

Permeability is moderate, and available water capacity is medium. Reaction is very strongly acid or strongly acid throughout the soil, except where the surface has been limed. The hazard of erosion is moderate.

Included with this soil in mapping are small areas of browner, less clayey Norfolk soils; sandier Wagram soils; and a few small, scattered areas of Blaney and Vacluse soils, which have a brittle subsoil. These included soils make up less than 20 percent of most mapped areas.

Most areas of this soil are cultivated. A few areas are in woodland or pasture. These areas are being converted to urban uses at a rapid rate.

Faceville soil is well suited to growing crops, such as corn, soybeans, tobacco, small grains, cotton, and truck crops. Susceptibility to erosion is the main limitation. Minimum tillage, cover crops, stripcropping, field borders,

crop residue management, and contour farming help to reduce erosion.

This soil is well suited to growing grasses and legumes. Using this soil for pasture or hay is effective in controlling erosion. Pasture rotation and preventing overgrazing help to keep the pasture and soil in good condition.

This soil is suited to loblolly pine. The dominant trees are loblolly pine, southern red oak, white oak, and black oak. The main understory includes dogwood, holly, sassafras, and black cherry.

Faceville soil is suited to most urban uses. Moderate permeability and susceptibility to erosion are the main limitations. The soil is well suited to recreational uses.

This soil is in capability subclass Ite and woodland suitability group 3o.

FcB—Faceville-Urban land complex, 0 to 6 percent slopes. This map unit consists of areas of Faceville soil and areas of Urban land that are too small and too intermingled to be mapped separately. About 40 to 50 percent of the acreage is undisturbed Faceville soil, and about 30 to 40 percent is Urban land. Most areas of this unit are in and around the city of Fayetteville.

Typically, Faceville soil has a surface layer of grayish brown loamy sand 7 inches thick. The subsurface layer is pale brown loamy sand 10 inches thick. The subsoil to a depth of 70 inches is yellowish red sandy clay.

Permeability is moderate, and available water capacity is medium. Reaction is very strongly acid or strongly acid throughout the soil, except where the surface has been limed. The hazard of erosion is moderate.

Urban land consists of areas where the original soil has been covered by concrete, asphalt, buildings, or other impervious surfaces. Slope of Urban land is modified to fit the site and commonly ranges from 0 to 4 percent.

Included with this unit in mapping are small areas of browner, less clayey Norfolk soils; sandier Wagram soils; and Blaney soils, which are sandier than Faceville soil and have brittle layers in the subsoil. Also included are small areas of soils that are similar in color to Faceville soil but contain less clay or more silt. These included soils make up 10 to 20 percent of most mapped areas.

Undeveloped areas of this map unit are being converted to urban uses very rapidly. This map unit is well suited to nearly all urban and recreational uses. Susceptibility to erosion and moderate permeability are the main limitations. Revegetating disturbed areas promptly helps to reduce runoff and control erosion. Lawns and shrubs are relatively easy to maintain. There are no major limitations for onsite sewage disposal.

This unit has not been assigned to a capability subclass or woodland suitability group.

FuB—Fuquay sand, 0 to 4 percent slopes. This well drained soil is on broad flats of uplands. It is in the

northern and western parts of Cumberland and Hoke Counties. Individual areas of this unit are irregular in shape and range from 5 acres to more than 50 acres in size.

Typically, the surface layer is dark gray sand 3 inches thick. The subsurface layer is light yellowish brown sand 26 inches thick. The subsoil to a depth of 80 inches is yellowish brown sandy loam in the upper part; yellowish brown sandy clay loam in the middle part; and mottled strong brown, gray, and red sandy clay loam in the lower part.

Permeability is moderate in the upper part of the subsoil and slow in the lower part. Available water capacity is low. Reaction is very strongly acid or strongly acid throughout the soil, except where the surface has been limed. A perched water table is above the lower part of the subsoil briefly during wet periods. The seasonal high water table is at a depth of 4 to 6 feet, however, throughout most of the year.

Included with this soil in mapping are small areas of less sandy Dothan soils; sandier Candor soils; and Blaney soils, which have brittle layers in the subsoil. These included soils make up less than 15 percent of most mapped areas.

Most areas of this soil are in cultivated crops, pasture, or hay. The rest are in woodland.

Fuquay soil is suited to cultivated crops, such as corn, soybeans, tobacco, and small grains. Leaching of plant nutrients, wind erosion, and low available water capacity are the main limitations. Crop residue management, minimum tillage, and cover crops help to control wind erosion and to reduce leaching of nutrients. A good conservation alternative is to use this soil for hay or pasture. It is suited to bermudagrass and bahiagrass.

This soil is suited to loblolly and longleaf pines (fig. 5). The main understory includes sassafras, holly, and dogwood.

This soil is well suited to most urban uses and is suited to recreational uses. Lawns and shrubs may be difficult to maintain because of droughtiness.

This soil is in capability subclass IIs and woodland suitability group 3s.

GdB—Gilead loamy sand, 2 to 8 percent slopes. This moderately well drained soil is on side slopes along streams in uplands. It is mostly in the northern and western parts of Cumberland and Hoke Counties. Mapped areas are 5 to 40 acres in size and are elongated or irregular in shape.

Typically, the surface layer is dark gray loamy sand 4 inches thick. The subsurface layer is light yellowish brown loamy sand 9 inches thick. The subsoil to a depth of 70 inches is brownish yellow sandy clay in the upper part; mottled strong brown, brownish yellow, and light gray sandy clay in the middle part; and reddish yellow sandy loam in the lower part.



Figure 5.—Longleaf pine on Fuquay sand, 0 to 4 percent slopes.

Permeability is moderately slow or slow. A perched water table commonly is above the clayey, brittle subsoil for brief periods during wet seasons. Available water capacity is medium to high. Reaction is very strongly acid or strongly acid throughout the soil, except where the surface has been limed. The hazard of erosion is moderate where the soil is exposed.

Included with this soil in mapping are small areas of sandier Blaney and Fuquay soils; less clayey Vaucluse soils; and Dothan soils, which have a thicker, less brittle subsoil. This Gilead soil has numerous seepage areas on hillsides. These seeps are usually less than an acre in size and are identified by a special wet spot symbol. These included soils make up less than 20 percent of most mapped areas.

Most areas of this soil are in woodland. The rest are in cultivated crops.

Gilead soil is suited to growing cultivated crops, such as corn, soybeans, tobacco, and small grains. Susceptibility to erosion is the main limitation. Winter cover crops, minimum tillage, and crop residue management help to control erosion and to maintain tilth. Field borders, crop rotations that include close-growing crops, contour farming, and strip cropping also help to conserve soil and water. Using this soil for hay or pasture is a good conservation alternative. This soil is well suited to grasses and legumes.

Gilead soil is suited to loblolly and longleaf pines. The understory includes blackjack oak, dogwood, sourwood, holly, and threeawn.

This soil is suited to most urban and recreational uses. Wetness and slow permeability of the clayey subsoil are the main limitations. These characteristics result in water seeping out of the hillside in some areas during wet periods. Wetness can be a limitation if houses, waste disposal systems, or recreational structures are placed in these seep areas.

This soil is in capability subclass IIIe and woodland suitability group 3o.

GdD—Gilead loamy sand, 8 to 15 percent slopes.

This moderately well drained soil is on side slopes of uplands. It is mostly in the northern and western parts of Cumberland and Hoke Counties. Mapped areas are 5 acres to about 40 acres in size and are elongated or irregular in shape.

Typically, the surface layer is dark gray loamy sand 4 inches thick. The subsurface layer is light yellowish brown loamy sand 9 inches thick. The subsoil to a depth of 70 inches is brownish yellow sandy clay in the upper part; mottled strong brown, brownish yellow, and light gray sandy clay in the middle part; and reddish yellow sandy loam in the lower part.

Permeability is moderately slow or slow. Available water capacity is medium to high. Reaction is very strongly acid or strongly acid throughout the soil, except where the surface has been limed. The hazard of

erosion is severe where the soil is exposed. A perched water table is 1.5 to 2.5 feet below the surface.

Included with this soil in mapping are small areas of sandier Blaney and Fuquay soils; less clayey Vacluse soils; and Dothan soils, which have a thicker, less brittle subsoil. This Gilead soil has numerous seepage areas on hillsides. The seeps usually are less than 1 acre in size and are identified by a special wet spot symbol on the soil maps. In some mapped areas, short, vertical slopes have been created by the mass movement of soil down the hill. These exposed walls usually consist of massive, gray clay. The included soils make up less than 20 percent of most mapped areas.

Nearly all areas of this soil are in woodland, and a small acreage is used for pasture.

This soil is poorly suited to growing cultivated crops. Susceptibility to erosion is the main limitation. Because of slope, erosion is very difficult to control if cultivated crops are grown on this soil. Growing grasses or legumes for hay or pasture is a good conservation alternative. If this soil is used for pasture, proper stocking rates, pasture rotation, and restricted use during wet periods help to keep the pasture and soil in good condition.

Gilead soil is suited to loblolly and longleaf pines. There are no significant limitations to woodland use and management. Care must be taken during planting and harvesting to limit soil disturbance and reduce erosion.

This soil is suited to most urban and recreational uses. Wetness, slope, and slow permeability in the clayey subsoil are limiting factors. The combination of slope, wetness, and slow permeability results in water seeping out of the hillside in some areas during wet periods. Wetness can be a limitation if buildings, houses, waste disposal systems, or recreational structures are placed in these seep areas.

This soil is in capability subclass Vle and woodland suitability group 3o.

GoA—Goldsboro loamy sand, 0 to 2 percent slopes. This moderately well drained soil is on broad, smooth flats of uplands. It is most extensive in the southern part of Hoke County and in the southern and eastern parts of Cumberland County. Individual areas of this unit are irregular in shape and range from 5 to 75 acres in size.

Typically, the surface layer is dark grayish brown loamy sand 11 inches thick. The subsoil to a depth of 72 inches is yellowish brown sandy clay loam in the upper part; gray sandy clay loam in the middle part; and gray sandy loam in the lower part.

Permeability is moderate, and available water capacity is medium. Reaction is very strongly acid or strongly acid throughout the soil, except where the surface has been limed. The seasonal high water table is at a depth of 2 to 3 feet during winter and early spring.

Included with this soil in mapping are small areas of better drained Norfolk and Aycock soils; more clayey Duplin soils; more silty Exum soils; and wetter Lynchburg, Nahunta, and Dunbar soils. These included soils make up less than 15 percent of most mapped areas.

Most areas of this soil are in cultivated crops. A small acreage remains in woodland.

Goldsboro soil is well suited to growing cultivated crops, such as corn, soybeans, small grains, and tobacco, and to pasture. Artificial drainage is needed in some areas for optimum growth of tobacco and other crops that require a drier soil.

This soil is well suited to hardwoods and pines. The dominant trees are loblolly pine, white oak, and southern red oak. The understory includes dogwood, red maple, holly, and sourwood. There may be some equipment limitations if trees are harvested or planted during wet periods.

Goldsboro soil is suited to most urban and recreational uses. Wetness is the main limitation.

This soil is in capability subclass llw and woodland suitability group 2w.

Gr—Grantham loam. This nearly level, poorly drained soil is on broad, smooth flats of uplands. It is most extensive in the eastern part of Cumberland County. Individual areas of this unit are irregular in shape and range from 5 to 200 acres in size.

Typically, the surface layer is dark gray loam 5 inches thick. The subsoil to a depth of 72 inches is gray silt loam in the upper part and gray clay loam in the lower part.

Permeability is moderately slow. Reaction is very strongly acid or strongly acid throughout the soil, except where the surface has been limed. The seasonal high water table is at or near the surface during winter and early spring.

Included with this soil in mapping are small areas of more clayey Coxville soils and less silty Rains soils. Also included are small areas of better drained Dunbar, Lynchburg, and Nahunta soils. In addition to being better drained, Dunbar soils are more clayey and Lynchburg soils are less silty than Grantham soil. These included soils make up less than 15 percent of most mapped areas.

Most areas of this soil are in woodland, but a small acreage is in crops or pasture.

Where drained, Grantham soil is suited to growing cultivated crops, such as corn and soybeans.

This soil is well suited to grasses and legumes. If this soil is used for pasture, proper stocking rates, pasture rotation, timely deferment of grazing, and restricted use during wet periods help to keep the pasture and soil in good condition.

Grantham soil is well suited to hardwoods and pines. The dominant trees are loblolly pine, water oak,

sweetgum, and red maple. The main understory includes greenbrier, holly, sweetbay, sourwood, sassafras, and giant cane. Wetness restricts the use of equipment.

Because of wetness, moderately slow permeability, and low strength, this soil is poorly suited to nearly all urban and recreational uses.

This soil is in capability subclass VIw and woodland suitability group 2w.

JT—Johnston loam. This nearly level, very poorly drained soil is along major drainageways. It is on flood plains throughout the survey area. Although this unit was mapped with fewer detailed observations than were most other units in the survey, the resulting delineations meet the needs for the major anticipated uses of the soils. The boundaries were drawn from limited field observations, using aerial photographs as aids for interpretation. Individual areas of this unit are long and narrow in shape and range from 50 acres to more than 500 acres in size.

Typically, the surface layer is very dark gray loam 42 inches thick. The underlying material to a depth of 80 inches is dark grayish brown sandy loam in the upper part and light brownish gray sand in the lower part.

Permeability is moderately rapid in the upper part of the soil and rapid in the lower part. Reaction is very strongly acid or strongly acid throughout. The seasonal high water table is at or above the surface most of the year. This soil is subject to frequent flooding.

Included with this soil in mapping are areas of soils that have a surface tier of muck. Also included are small areas of Torhunta soils that have a thinner surface layer; sandier Lynn Haven soils; and poorly or very poorly drained soils that are sandy throughout. These included soils make up less than 20 percent of most mapped areas.

Most areas of this unit are in woodland. A few areas have been cleared for pasture or row crops.

This soil is poorly suited to growing cultivated crops, such as corn and soybeans. Drainage and flood protection are required for growing crops on this soil. A suitable outlet for drainage, however, usually is hard to find. Johnston soil is poorly suited to pasture or hay because of wetness and flooding.

This soil is well suited to hardwoods and pines. Water tupelo and baldcypress can be grown without artificial drainage. If the soil is properly drained, yellow-poplar and loblolly pine can be grown. The understory includes greenbrier, switchcane, and red maple. Equipment limitations can be expected if trees are harvested or planted during wet periods. Competing vegetation may need to be controlled to insure adequate survival of planted seedlings. Bedding the land and planting trees in the raised rows improve seedling survival and growth.

This soil is poorly suited to urban and recreational uses. Wetness, flooding, and low strength are the main limitations.

This soil is in capability subclass VIIw and woodland suitability group 1w.

KaA—Kalmia loamy sand, 0 to 2 percent slopes.

This well drained soil is on smooth terraces along the Lower Little River and Rockfish Creek. This soil is in Cumberland County. Individual areas of this unit are somewhat elongated or irregular in shape and range from 5 to 50 acres in size.

Typically, the surface layer is dark grayish brown loamy sand 9 inches thick. The subsurface layer is light yellowish brown loamy sand 5 inches thick. The subsoil is yellowish brown sandy clay loam 20 inches thick. The underlying material to a depth of 80 inches is light yellowish brown loamy sand in the upper part and brownish yellow sand in the lower part.

Permeability is moderate, and available water capacity is medium. Reaction ranges from very strongly acid through medium acid in all horizons, except where the surface has been limed. This soil is subject to rare flooding.

Included with this soil in mapping are small areas of similar soils that are wetter. Also included are small areas of sandier Kenansville soils. Some delineations contain small areas of soils that are gravelly sand throughout. These included soils make up less than 15 percent of most mapped areas.

Most areas of this soil are in woodland. The rest are in cultivated crops or pasture.

Kalmia soil is well suited to crops, such as corn, soybeans, tobacco, and small grains. There are no significant limitations. Minimum tillage, cover crops, crop residue management, and the use of grasses and legumes in the cropping system help to maintain tilth and production.

Kalmia soil is well suited to grasses and legumes for pasture and hay. There are no major limitations in using this soil for pasture. Overgrazing causes surface compaction and poor tilth. Proper stocking rates and pasture rotation help to keep the pasture and soil in good condition.

Kalmia soil is well suited to hardwoods and pines. The dominant trees grown are loblolly pine, white oak, southern red oak, black oak, and hickory. The main understory includes holly, dogwood, persimmon, and sassafras.

This soil is suited to all urban and recreational uses. Flooding is the main limitation.

This soil is in capability class I and woodland suitability group 2o.

KeA—Kenansville loamy sand, 0 to 3 percent slopes. This well drained soil is on smooth terraces mostly along the Lower Little River and Rockfish Creek. This soil is in Cumberland County. Individual areas of this unit are somewhat elongated or irregular in shape and range from 5 acres to over 40 acres in size.

Typically, the surface layer is grayish brown loamy sand 8 inches thick. The subsurface layer is very pale brown loamy sand 16 inches thick. The subsoil is 26 inches thick. The upper part of the subsoil is yellowish brown sandy loam, and the lower part is yellowish brown loamy sand. The underlying material to a depth of 80 inches is brownish yellow sand in the upper part, white sand in the middle part, and light gray sand in the lower part.

Permeability is moderately rapid, and available water capacity is low. Reaction is very strongly acid through medium acid in all horizons, except where the surface has been limed. This soil is subject to rare flooding.

Included with this soil in mapping are small areas of more clayey Kalmia soils and soils similar to Kalmia soils except that they are wetter. Some delineations contain small areas of soils that are gravelly sand throughout. These included soils make up less than 15 percent of most mapped areas.

Most areas of this soil are in woodland. The rest are in cultivated crops or pasture.

Kenansville soil is suited to growing crops, such as corn, tobacco, and soybeans and to grasses and legumes for hay and pasture. If this soil is used for cultivated crops, leaching of plant nutrients, wind erosion, and low available water capacity are the main limitations. Minimum tillage, crop residue management, cover crops, and including grasses and legumes in the cropping system help to control wind erosion and reduce leaching.

Kenansville soil is suited to loblolly pine. The dominant trees are loblolly pine, longleaf pine, turkey oak, and hickory. The understory includes holly, dogwood, sourwood, and sassafras. The deep sand might restrict the use of equipment, and the low available water capacity might reduce seedling survival.

This soil is suited to most urban and recreational uses. Flooding is the main limitation. Lawns and shrubs may be difficult to maintain because of droughtiness and leaching of plant nutrients. The thick sandy surface is a moderate limitation to most recreational uses.

This soil is in capability subclass IIs and woodland suitability group 3s.

KuB—Kureb sand, 1 to 8 percent slopes. This excessively drained soil is on long and broad, undulating ridges between and along the rims of Carolina bays in the southeastern part of Cumberland County. Individual areas of this unit are irregular in shape or are long and curved. They are on ridges at the southeastern end of large bays. They range from 10 to 50 acres in size.

Typically, the surface layer is gray sand 4 inches thick. The subsurface layer is light gray sand 20 inches thick. The underlying material to a depth of 82 inches is brownish yellow sand in the upper part and light yellowish brown sand in the lower part.

Permeability is rapid, and available water capacity is low. Reaction ranges from strongly acid through neutral in all horizons.

Included with this soil in mapping are small areas of less sandy Lakeland soils. Also included are small areas of wetter Leon, Lynn Haven, and Torhunta soils. These included soils make up less than 20 percent of most mapped areas.

Nearly all areas of this soil are in woodland. Turkey oak and scattered longleaf pine are the dominant trees.

Kureb soil is poorly suited to growing most cultivated crops. The major limitations are droughtiness, leaching of plant nutrients, and wind erosion. If this soil is used for crops, minimum tillage and the use of a close-growing cover crop are practices that help control wind erosion and reduce leaching.

This soil is poorly suited to grasses and legumes. The main limitation is low available water. Of the common forages, bahiagrass and Coastal and common bermudagrass are best adapted to this soil.

Kureb soil is poorly suited to trees. The dominant trees are longleaf pine and turkey oak. The understory is very sparse. It consists largely of clumps of threeawn and some lichens. The loose, sandy surface can severely limit equipment use.

This soil is suited to most urban and recreational uses. The loose, sandy surface may limit some recreational activities.

This soil is in capability subclass VIIs and woodland suitability group 5s.

LaB—Lakeland sand, 1 to 8 percent slopes. This excessively drained soil is on broad ridges of uplands and rims of bays. This soil is throughout the survey area. Individual areas of this unit are irregular in shape and range from 10 acres to more than 200 acres in size.

Typically, the surface layer is dark gray sand 6 inches thick. The underlying material to a depth of 82 inches is yellowish brown or strong brown sand in the upper part, reddish yellow or brownish yellow sand in the middle part, and yellow sand in the lower part.

Permeability is very rapid, and available water capacity is low. Reaction is strongly acid or medium acid throughout the soil, except where the surface has been limed.

Included with this soil in mapping are small areas of less sandy Autryville and Candor soils. Also included are small areas of sandier Kureb soils. These included soils make up less than 20 percent of most mapped areas.

Most areas of this soil are in woodland. The rest are in pasture, hay, and crops or are idle fields. Some areas are being converted to urban use.

Lakeland soil is poorly suited to growing row crops, such as corn and soybeans, and to pasture. Its limitations include droughtiness, leaching of plant nutrients, and wind erosion. Minimum tillage and the use

of close-growing cover crops are practices that help to control wind erosion and reduce leaching.

This soil is poorly suited to grasses and legumes. The main limitation is droughtiness.

This soil is poorly suited to trees. The dominant trees are longleaf and loblolly pines. The understory includes turkey oak, dogwood, sourwood, and sassafras.

Droughtiness is the main limitation. Survival and growth of planted seedlings are improved by bedding the land and

planting in the low areas (fig. 6). The loose sandy surface can limit equipment use.

This soil is suited to most urban and recreational uses. Lawns and shrubs require irrigation and frequent applications of lime and fertilizer. Rapid permeability is a limitation to onsite sewage disposal.

This soil is in capability subclass IVs and woodland suitability group 4s.



Figure 6.—Bedding improves survival and growth of longleaf pine on Lakeland sand, 1 to 8 percent slopes.

LbB—Lakeland-Urban land complex, 1 to 8 percent slopes. This map unit consists of areas of Lakeland soil and areas of Urban land that are too small and too intermingled to be mapped separately. About 40 to 50 percent of the unit is undisturbed Lakeland soil and about 30 to 40 percent is Urban land. This unit is most extensive in and around the city of Fayetteville.

Lakeland soil typically has a surface layer of dark gray sand 6 inches thick. The underlying material to a depth of 82 inches is yellowish brown or strong brown sand in the upper part, reddish yellow or brownish yellow sand in the middle part, and yellow sand in the lower part.

Permeability is very rapid, and available water capacity is low. Reaction is strongly acid or medium acid throughout the soil, except where the surface has been limed.

Urban land consists of areas where the original soil has been covered by concrete, asphalt, buildings, or other impervious surfaces. Slope is modified to fit the site and commonly ranges from 0 to 4 percent.

Included with this unit in mapping are small areas of less sandy Autryville, Blaney, Candor, and Wagram soils. These included soils make up 10 to 20 percent of the unit.

Undeveloped areas of this map unit are being converted to urban uses very rapidly. This map unit is well suited to most urban and recreational uses. Rapid permeability is a limitation to onsite sewage disposal. Irrigation and additions of lime and fertilizers usually are required to establish and maintain lawns and shrubs.

This unit has not been assigned to a capability subclass or woodland suitability group.

Ld—Lenoir loam. This nearly level, somewhat poorly drained soil is on broad, smooth flats of uplands. It is mostly in the vicinity of Slocumb in Cumberland County. Individual areas of this unit are irregular in shape and range from 5 acres to over 100 acres in size.

Typically, the surface layer is grayish brown loam 3 inches thick. The subsoil to a depth of 72 inches is yellowish brown loam in the upper part, pale brown silty clay loam and gray silty clay in the middle part, and gray clay in the lower part. The yellowish brown loam has light gray mottles.

Permeability is slow, and available water capacity is medium. Reaction is very strongly acid or strongly acid in all horizons, except where the surface has been limed. The seasonal high water table is within 1 foot to 2.5 feet of the surface during the winter and early spring.

Included with this soil in mapping are small areas of moderately well drained Craven soils and poorly drained soils of similar texture. These included soils make up less than 20 percent of most mapped areas.

Most areas of this soil are in woodland. A small acreage is in cultivated crops.

Lenoir soil is suited to growing crops, such as corn and soybeans. Artificial drainage usually is needed for

optimum production. Minimum tillage, crop residue management, cover crops, and including grasses and legumes in the cropping system help to maintain tilth and production.

This soil is well suited to grasses and legumes for hay and pasture. If this soil is used for pasture, proper stocking rates, pasture rotation, and restricted use during wet periods help to keep the pasture and soil in good condition.

This soil is well suited to hardwoods and pines. The dominant trees are maple, sweetgum, loblolly pine, willow oak, and water oak. The main understory includes canes, holly, sourwood, and greenbrier. Wetness can restrict the use of equipment from November to April.

This soil is poorly suited to most urban uses. Wetness and slow permeability are the main limitations.

Lenoir soil is in capability subclass IIIw and woodland suitability group 2w.

Le—Leon sand. This nearly level, poorly drained soil is on low flats and in depressions between Carolina bays. It is most extensive in the southeastern part of Cumberland County. Individual areas of this unit are irregular in shape and range from 5 to 100 acres in size.

Typically, this soil is sand to a depth of 80 inches. The surface layer is very dark gray. It is made up of many clean sand grains that give it a salt and pepper appearance. It is 5 inches thick. The subsurface layer is gray sand 14 inches thick. The subsoil is sand that is 29 inches thick. The upper part is black, the middle part is dark brown, and the lower part is dark yellowish brown. The underlying material to a depth of 80 inches is pale brown sand.

Permeability is rapid in the surface layer and moderate to moderately rapid in the subsoil. Reaction is extremely acid through strongly acid in all horizons. The seasonal high water table is at or near the surface during winter and early spring. Because it is sandy throughout, however, this soil may be droughty during summer months when the water table is low.

Included with this soil in mapping are small areas of wetter Lynn Haven and Torhunta soils, better drained Pactolus soils, and soils that have finer textured horizons between depths of 40 and 60 inches. Also included are isolated areas of excessively drained Lakeland and Kureb soils. In a few scattered areas, soils have brittle layers in the subsoil. Typically, only two or three of these included soils are in a mapped area, and, normally, they make up less than 20 percent of any mapped area.

Most areas of this soil are in woodland. The rest are in pasture or crops.

Leon soil is poorly suited to growing cultivated crops, such as corn and soybeans. A high water table can limit planting operations in the spring. During the dry summer months, however, low available water capacity limits the growth of most crops. Leaching of plant nutrients is also

a problem on this soil. Leon soil is well suited to growing some varieties of blueberries.

This soil is poorly suited to grasses and legumes for hay and pasture. Wetness can limit grazing in the winter and early spring. Droughtiness during dry summer months can make it difficult to maintain an adequate stand of grass.

Leon soil is poorly suited to trees. Loblolly pine is the main tree grown. The understory includes greenbrier, red maple, and threeawn. Droughtiness during the growing season can reduce the growth of trees and the survival of planted seedlings. A seasonal high water table during winter and early spring can limit planting or harvesting.

Leon soil is poorly suited to most urban and recreational uses. Wetness during winter and spring or after extended periods of rain limits onsite sewage disposal. Because of droughtiness during the summer, frequent irrigation may be required to properly maintain lawns. Lawns may also require frequent applications of fertilizers.

This soil is in capability subclass IVw and woodland suitability group 4w.

Ly—Lynchburg sandy loam. This nearly level, somewhat poorly drained soil is on broad, smooth flats of uplands. It is most extensive in the eastern part of Cumberland County and the southern part of Hoke County. Individual areas of this unit are irregular in shape and generally range from 5 to 50 acres in size.

Typically, the surface layer is dark gray sandy loam 6 inches thick. The subsoil to a depth of 72 inches is light yellowish brown sandy loam in the upper part, light yellowish brown sandy clay loam that has gray mottles and gray sandy clay loam in the middle part, and light brownish gray sandy loam in the lower part.

Permeability is moderate, and available water capacity is medium. Reaction ranges from extremely acid through strongly acid in all horizons, except where the surface has been limed. The seasonal high water table is 0.5 foot to 1.5 feet below the surface during winter and early spring.

Included with this soil in mapping are small areas of the better drained Goldsboro and Exum soils; less clayey Stallings and Pactolus soils; more silty Nahunta soils; and wetter Rains, Grantham, and Woodington soils. These included soils make up less than 20 percent of most mapped areas.

Most areas of this soil are cultivated. The rest are in woodland or pasture.

Lynchburg soil is well suited to growing cultivated crops, such as corn, soybeans, and small grains. Artificial drainage is needed for optimum production of tobacco and other crops that require a drier soil. Minimum tillage, cover crops, and including grasses and legumes in the cropping system help maintain tilth and production.

This soil is well suited to grasses and legumes for hay and pasture. If this soil is used for pasture, proper stocking rates, pasture rotation, timely deferment of grazing, and restricted use during wet periods help to keep the pasture and soil in good condition.

This soil is well suited to hardwoods and pines. The dominant trees are maple, sweetgum, loblolly pine, willow oak, and water oak. The main understory includes switchcane, holly, sourwood, and greenbrier. Wetness can restrict the use of equipment from November to April.

This soil is poorly suited to most urban and recreational uses because of wetness.

This soil is in capability subclass IIw and woodland suitability group 2w.

Mc—McColl loam. This nearly level, poorly drained soil is in shallow, oval depressions of uplands. It is most extensive in the southern part of Hoke County. Individual areas of this unit are oval and range from 5 acres to more than 100 acres in size.

Typically, the surface layer is very dark gray loam 7 inches thick. The subsoil is 44 inches thick. The upper part of the subsoil is light brownish gray clay. The middle part is compact, brittle sandy clay loam that is yellowish brown in the upper part and strong brown in the lower part. The lower part of the subsoil is gray sandy clay loam. The underlying material to a depth of 72 inches is gray sandy loam.

Permeability is slow. Reaction is very strongly acid or strongly acid throughout the soil, except where the surface has been limed. The seasonal high water table is at or near the surface during winter and early in spring. Water often briefly ponds on the surface after heavy rains.

Included with this soil in mapping are small areas of poorly drained Coxville and Rains soils and very poorly drained Pantego soils. These included soils do not have brittle layers in the subsoil. They make up less than 15 percent of most mapped areas.

About one-half of this unit has been drained and is used for crops or pasture. The other half is in woodland.

McColl soil is suited to growing corn, soybeans, and small grains. Artificial drainage is needed for optimum production. Even if the soil is artificially drained, tillage may be delayed in the spring because of wetness or after heavy rains because of ponding.

This soil is suited to grasses and legumes for pasture and hay. If this soil is used for pasture, proper stocking rates, pasture rotation, timely deferment of grazing, and restricted use during wet periods help to keep the pasture and soil in good condition.

This soil is poorly suited to hardwoods and pines. It is well suited to loblolly pine if drained. The dominant trees are loblolly pine, water oak, sweetgum, and red maple. If the soil is drained, hardwoods, such as southern red oak and white oak, grow. The main understory includes

greenbrier, holly, sweetbay, sourwood, sassafras, and giant cane. Wetness restricts the use of equipment.

Because of wetness and slow permeability, this soil is poorly suited to urban and recreational uses.

This soil is in capability subclass VIw and woodland suitability group 5w.

Na—Nahunta loam. This nearly level, somewhat poorly drained soil is on broad, smooth flats of uplands. It is most extensive in the eastern part of Cumberland County. Individual areas of this unit are irregular in shape and range from 5 acres to 60 acres in size.

Typically, the surface is very dark gray loam 4 inches thick. The subsoil to a depth of 72 inches is brownish yellow loam in the upper part, brownish yellow clay loam and gray clay loam in the middle part, and mottled light gray and yellow clay in the lower part.

Permeability is moderate, and available water capacity is high. Reaction is very strongly acid or strongly acid throughout the soil, except where the surface has been limed. The seasonal high water table is 1 foot to 2 feet below the surface during winter and early spring.

Included with this soil in mapping are small areas of better drained Exum soils; less silty, better drained Goldsboro soils; less silty Lynchburg soils; wetter Grantham soils; and wetter, less silty Rains soils. Typically, no more than two or three of these included soils are in any one mapped area, and they make up less than 20 percent of the unit.

About one-half of this soil is cultivated. The other half is in woodland or pasture.

Nahunta soil is well suited to growing cultivated crops, such as corn, soybeans, and small grains. Artificial drainage is needed for optimum production of tobacco and other crops that require a drier soil. Minimum tillage, cover crops, and including grasses and legumes in the conservation cropping system help to maintain tilth.

This soil is well suited to grasses and legumes for hay and pasture. If this soil is used for pasture, proper stocking rates, pasture rotation, timely deferment of grazing, and restricted use during wet periods help to keep the pasture and soil in good condition.

This soil is well suited to hardwoods and pines. The dominant trees are loblolly pine, water oak, sweetgum, and red maple. If the soil is drained, hardwoods, such as southern red oak and white oak, grow. The main understory includes greenbrier, holly, sweetbay, sourwood, sassafras, and giant cane. Wetness restricts the use of equipment.

This soil is poorly suited to most urban and recreational uses because of wetness.

This soil is in capability subclass IIw and woodland suitability group 2w.

NoA—Norfolk loamy sand, 0 to 2 percent slopes. This well drained soil is on broad, smooth flats of uplands. It is most extensive in the southern part of

Hoke County and in the southern and eastern parts of Cumberland County. Individual areas of this unit are irregular in shape and range from 5 acres to more than 200 acres in size.

Typically, the surface layer is brown loamy sand 8 inches thick. The subsurface layer is light yellowish brown loamy sand 4 inches thick. The subsoil is sandy clay loam to a depth of 72 inches. It is yellowish brown in the upper part and mottled brownish yellow, red, and pale brown in the lower part.

Permeability is moderate, and available water capacity is medium. Reaction is strongly acid or medium acid throughout the soil, except where the surface has been limed. The seasonal high water table is 4 to 6 feet below the surface during winter and early in spring.

Included with this soil in mapping are small areas of wetter Goldsboro soils; siltier Aycock soils; redder, more clayey Faceville soils; and sandier Wagram soils. Small areas of Dothan soils, which have more than 5 percent plinthite in the subsoil, also are included in some delineations. These included soils make up less than 20 percent of most mapped areas.

Most areas of this soil are cultivated. A few small areas are in woodland or pasture or are urban.

This soil is well suited to growing cultivated crops, such as corn, soybeans, small grains, tobacco, cotton, and truck crops. There are no major limitations to using this soil for cultivated crops. Minimum tillage, cover crops, and the use of close-growing grasses and legumes in the conservation cropping system help to maintain tilth and to conserve moisture.

This soil is well suited to grasses and legumes. There are no major limitations for pasture or hay. If this soil is used for pasture, however, proper rotation and prevention of overgrazing help to keep the pasture and soil in good condition.

This soil is well suited to growing loblolly pine. The dominant trees are loblolly pine, white oak, southern red oak, black oak, and hickory. The main understory includes holly, dogwood, persimmon, and sassafras.

This soil is well suited to most urban and recreational uses. Wetness can be a limitation in some areas if excavation for a basement is planned or septic tank absorption fields are used.

This soil is in capability class I and woodland suitability group 2o.

NoB—Norfolk loamy sand, 2 to 6 percent slopes.

This well drained soil is on convex ridges and smooth side slopes of uplands. It is most extensive in the southern part of Hoke County and in the southern and eastern parts of Cumberland County. Individual areas of this unit are irregular in shape and range from 3 acres to more than 100 acres in size.

Typically, the surface layer is brown loamy sand 8 inches thick. The subsurface layer is light yellowish brown loamy sand 4 inches thick. The subsoil is sandy

clay loam to a depth of 72 inches. It is yellowish brown in the upper part and mottled brownish yellow, red, and pale brown in the lower part.

Permeability is moderate, and available water capacity is medium. Reaction is strongly acid or medium acid throughout the soil, except where the surface has been limed. The hazard of erosion is moderate. The seasonal high water table is within 4 to 6 feet of the surface during winter and early spring.

Included with this soil in mapping are small areas of siltier Aycock soils; redder, more clayey Faceville soils; and sandier Wagram soils. Also included are small areas of Dothan soils that have a subsoil containing more than 5 percent plinthite, by volume. These included soils make up less than 20 percent of most mapped areas.

Most areas of this soil are cultivated. A few areas are in woodland or pasture or are urban.

This soil is well suited to growing corn, soybeans, tobacco, small grains, cotton, and truck crops. Susceptibility to erosion is the main limitation. Minimum tillage, cover crops, stripcropping, field borders, crop residue management, and contour farming help to reduce erosion.

This soil is well suited to grasses and legumes. Using this soil for pasture or hay is effective in controlling erosion. If this soil is used for pasture, proper rotation and preventing overgrazing help to keep the pasture and soil in good condition.

This soil is well suited to loblolly pine. The dominant trees are loblolly pine, white oak, southern red oak, and hickory. The main understory includes holly, dogwood, persimmon, and sassafras.

This soil is well suited to most urban and recreational uses. Wetness can be a limitation in some areas if excavation for a basement is planned or septic tank absorption fields are used.

This soil is in capability subclass IIe and woodland suitability group 2o.

Pa—Pactolus loamy sand. This nearly level, moderately well drained to somewhat poorly drained soil is on broad, smooth flats of uplands and on terraces of small streams. It is most extensive in the eastern part of Cumberland County. A few areas of this soil are in Hoke County, mostly in the eastern part of the county and on terraces of the Lower Little River. Individual areas of this soil are irregular in shape and range from 5 acres to more than 75 acres in size.

Typically, the surface layer is dark grayish brown loamy sand 9 inches thick. The underlying material to a depth of 82 inches is light yellowish brown loamy sand and very pale brown sand in the upper part, yellow loamy sand in the middle part, and very pale brown sand in the lower part.

Permeability is rapid, and available water capacity is low. Reaction is very strongly acid or strongly acid throughout the soil, except where the surface has been

limed. The seasonal high water table is 1.5 to 3 feet below the surface during winter and early in spring.

Included with this soil in mapping are small areas of better drained Lakeland, Candor, and Autryville soils and more clayey Stallings soils. Also included are small areas of similar soils that have thin, discontinuous, organic stained layers below a depth of 30 inches. These included soils make up less than 20 percent of most mapped areas.

Most of the acreage is cultivated or in pasture, and the rest is mainly in woodland. A few small areas are urban.

This soil is poorly suited to growing cultivated crops, such as corn, soybeans, small grains, and tobacco. The main limitation is low available water capacity. Minimum tillage, crop residue management, windbreaks, and close-growing grasses and legumes in the cropping system help to conserve moisture, to reduce leaching, and to control wind erosion. Using this soil for pasture or hay is a good way to conserve soil and water. Pactolus soil is suited to pasture forage, such as Coastal bermudagrass and bahiagrass.

This soil is suited to loblolly pine. The dominant trees are loblolly pine, sweetgum, water oak, maple, and blackgum. The main understory includes holly, blueberry, greenbrier, sourwood, and switchcane. Wetness can restrict the use of equipment.

This soil is poorly suited to most urban uses and is suited to recreational uses. Wetness is the main limitation.

Pactolus soil is in capability subclass IIIs and woodland suitability group 3w.

Pg—Pantego loam. This nearly level, very poorly drained soil is on low flats and in shallow, oval depressions of uplands. It is most extensive in the southern part of Hoke County and in the southern and eastern parts of Cumberland County. Individual areas of this unit are irregular or oval in shape and range from 5 acres to more than 50 acres in size.

Typically, the surface layer, 19 inches thick, is very dark gray loam. The subsoil to a depth of 72 inches is grayish brown sandy clay loam in the upper part, gray clay loam or sandy clay loam in the middle part, and light brownish gray sandy clay in the lower part.

Permeability is moderate. Reaction is extremely acid or very strongly acid throughout the soil, except where the surface has been limed. The seasonal high water table is at or near the surface during winter and early spring.

Included with this soil in mapping are small areas of better drained Rains soils; more clayey Byars soils; more clayey, better drained Coxville soils; and less clayey Torhunta soils. These included soils make up less than 20 percent of most delineations.

Most areas of this soil are in woodland. The rest are mainly in row crops.

Pantego soil is suited to growing cultivated crops, such as corn and soybeans. Artificial drainage is needed for

optimum production. In some areas suitable drainage outlets are not available.

This soil is suited to grasses and legumes for hay and pasture. Artificial drainage usually is needed. If this soil is used for pasture, proper stocking rates, pasture rotation, timely deferment of grazing, and restriction of use during wet periods help to keep the pasture and soil in good condition.

This soil is well suited to hardwoods and pines. The dominant trees grown are loblolly pine, water oak, sweetgum, and red maple. If the soil is drained, hardwoods, such as southern red oak and white oak, grow. The main understory includes greenbrier, holly, sweetbay, sourwood, sassafras, and giant cane. Wetness restricts the use of equipment.

This soil is poorly suited to all urban and recreational uses. Wetness is the main limitation.

This soil is in capability subclass VIw and woodland suitability group 1w.

Pt—Pits-Tarboro complex. This map unit consists of areas of Pits and areas of Tarboro soil that are too small and too intermingled to be mapped separately. About 60 percent of the unit is Pits, and about 20 percent is undisturbed Tarboro soil. This unit is along the Cape Fear River and its major tributaries in Cumberland County. Mapped areas are 5 acres to more than 300 acres in size and are irregular in shape.

Pits are areas where the soil has been removed and sand has been excavated (fig. 7). They usually are less than 25 feet deep. Small scattered bodies of water are common.

Tarboro soil consist of small undisturbed areas scattered among the Pits. These undisturbed areas usually are less than 3 acres in size. Undisturbed Tarboro soil typically has a surface layer of dark brown loamy sand 10 inches thick. The underlying material to a depth of 82 inches is strong brown, brownish yellow, or yellow sand.

Included with this unit in mapping are small areas of Altavista, Cape Fear, and Roanoke soils. These soils make up about 20 percent of this unit.

Lower lying areas near the Cape Fear River are subject to rare flooding.

This map unit is so variable that most soil interpretations require onsite investigation.

Pits are not assigned to a capability subclass or woodland group; Tarboro soil is in capability subclass IIIs and woodland suitability group 4s.

Ra—Rains sandy loam. This nearly level, poorly drained soil is on broad, smooth flats and in shallow depressions of uplands. It is most extensive in the southern part of Hoke County and in the southern and eastern parts of Cumberland County. Individual areas of this unit are oval or irregular in shape and range from 5 acres to more than 100 acres in size.

Typically, the surface is very dark gray sandy loam 5 inches thick. The subsoil to a depth of 72 inches is gray sandy loam in the upper part and gray sandy clay loam in the lower part.

Permeability is moderate. Reaction is very strongly acid or strongly acid throughout the soil, except where the surface has been limed. The seasonal high water table is at or near the surface during winter and early spring. Areas of this soil located in Carolina bays may be ponded for brief periods following heavy rain.

Included with this soil in mapping are small areas of more clayey Coxville soils, sandier Woodington soils, siltier Grantham soils, wetter Pantego soils, and better drained Lynchburg soils. Also included are small areas of soils that are similar to the Rains series but have less than 60 inches of loamy soil material over sandy stratified layers. Typically, only two or three of these included soils are in any mapped area, and they make up less than 20 percent of most mapped areas.

Most areas of this unit are in cultivated crops. The rest are in woodland.

Rains soils are suited to growing cultivated crops, such as corn, soybeans, and small grains. Artificial drainage is needed for optimum production.

This soil is suited to grasses and legumes for hay and pasture. Wetness is the main limitation. If this soil is used for pasture, proper stocking rates, pasture rotation, timely deferment of grazing, and restriction of use during wet periods help to keep the pasture and soil in good condition.

Rains soil is well suited to hardwoods and pines. The dominant trees are maple, sweetgum, loblolly pine, willow oak, and water oak. The main understory includes switchcane, holly, sourwood, and greenbrier. Wetness can restrict the use of equipment and damage seedlings from November to April.

This soil is poorly suited to nearly all urban and recreational uses. Wetness is the main limitation.

This soil is in capability subclass IVw and woodland suitability group 2w.

Ro—Roanoke and Wahee loams. These nearly level, poorly drained and somewhat poorly drained soils are on low flats and in depressions or along drainageways of terraces. They are along the Cape Fear River and its major tributaries in Cumberland County. Because of similarities in position on the landscape, use, and management, these two soils were not separated in mapping. Some mapped areas contain both Roanoke and Wahee soils, while other mapped areas contain only one of them. This unit contains about 50 percent Roanoke soil, 30 percent Wahee soil, and 20 percent soils of minor extent. Mapped areas typically are long and narrow and range from 5 acres to more than 50 acres in size.

Typically, Roanoke soil has a surface layer of grayish brown loam 8 inches thick. The subsoil is 47 inches



Figure 7.—Sand is being removed from this borrow pit in the Pits-Tarboro complex.

thick. The upper part of the subsoil is light brownish gray clay loam. The middle part is gray and dark gray clay. The lower part is gray clay loam. The underlying material to a depth of 80 inches is gray loamy sand.

Typically, Wahee soil has a surface layer of dark grayish brown loam 6 inches thick. The subsoil is 39 inches thick. The upper part is yellowish brown clay loam, the middle part is gray clay, and the lower part is gray clay loam. The underlying material to a depth of 65 inches is gray sand.

Permeability of Roanoke and Wahee soils is slow. Reaction is very strongly acid or strongly acid in all horizons, except where the surface has been limed. The seasonal high water table is at or near the surface during winter and early spring. Surface runoff is slow, which

results in ponding in some areas during wet periods. These soils are subject to flooding in some areas.

Included with these soils in mapping are better drained Dogue soils; better drained, less clayey Altavista soils; and wetter Cape Fear soils. Roanoke and Wahee soils are above Cape Fear soils and below Altavista and Dogue soils. These soils make up about 20 percent of the unit.

Most areas of these soils are in woodland, and the rest are in row crops or pasture. Small areas are urban.

Roanoke and Wahee soils are suited to cultivated crops, such as corn and soybeans. Wetness and flooding are the main limitations. Open ditch drainage systems help to lower the water table and to drain surface water more rapidly. Suitable outlets may not be

available in some areas. Even where the soils are drained, tillage can be delayed in spring because of wetness. If plowed when wet, the surface layer can form large clods which, upon drying, become hard and brittle.

These soils are well suited to growing grasses and legumes for hay and pasture (fig. 8). If these soils are used for pasture, proper stocking rates, pasture rotation, and restricted use during wet periods help to keep the pasture and soil in good condition.

These soils are well suited to hardwoods and pines. The dominant trees are loblolly pine, sweetgum, swamp chestnut oak, water oak, and maple. The main understory includes ironwood, sourwood, eastern cottonwood, and hawthorn. Wetness and flooding can restrict the use of equipment and damage seedlings.

Roanoke and Wahee soils are poorly suited to nearly all urban and recreational uses. Wetness, flooding, and high clay content are the main limitations.

Roanoke soil is in capability subclass Vw, and Wahee soil is in capability subclass IIIw. Both soils are in woodland suitability group 2w.

Ru—Roanoke-Urban land complex. This map unit consists of areas of nearly level, poorly drained Roanoke soil and areas of Urban land that are too small and too intermingled to be mapped separately. About 40 to 50 percent of this unit is undisturbed Roanoke soil and about 30 to 40 percent is Urban land. This unit is most extensive in and around the city of Fayetteville.

Typically, Roanoke soil has a surface layer of grayish brown loam 8 inches thick. The subsoil is 47 inches thick. The upper part is light brownish gray clay loam, the middle part is gray and dark gray clay, and the lower part is gray clay loam. The underlying material to a depth of 80 inches is light gray loamy sand.

Permeability is slow. Reaction is very strongly acid or strongly acid in all horizons, except where the surface has been limed. The seasonal high water table is at or near the surface for extended periods during winter and early spring. Surface runoff is slow, which results in ponding of water in some areas during wet periods. This soil is subject to rare flooding in some areas.

Urban land consists of areas where the original soil has been covered by concrete, asphalt, buildings, or other impervious surfaces. Slope is modified to fit the site and usually is less than 2 percent.

Included in mapping are small areas of Altavista, Dogue, Wahee, and Wickham soils. They are better drained and occupy higher parts of the landscape than Roanoke soils. The included soils make up less than 20 percent of most mapped areas.

The soil in this map unit is poorly suited to most urban and recreational uses. Wetness, flooding, high clay content, and low strength are the main limitations. Overcoming these limitations for urban use requires major soil reclamation, special design, and intensive maintenance. Most of the Urban land within this unit was developed

several decades or more ago. Very little additional development has taken place in recent years.

Because so much of this unit has been disturbed, any decision concerning soil use and management normally requires an onsite investigation.

This complex has not been assigned to a capability subclass or a woodland group.

St—Stallings loamy sand. This nearly level, somewhat poorly drained soil is on broad, smooth flats of uplands. It is mostly in the southern half of Cumberland County and east of the Cape Fear River. Individual areas of this unit are irregular in shape and range from 5 acres to more than 100 acres in size.

Typically, the surface layer is dark gray loamy sand 10 inches thick. The subsoil, 54 inches thick, is pale brown sandy loam in the upper part, light gray sandy loam in the middle part, and light brownish gray loamy sand in the lower part. The underlying material to a depth of 72 inches is very pale brown and light gray loamy sand.

Permeability is moderately rapid, and available water capacity is medium. Reaction ranges from extremely acid through strongly acid in all horizons, except where the surface has been limed. The water table is within 1 foot to 2.5 feet of the surface during winter and early in spring.

Included with this soil in mapping are small areas of better drained Butters soils, wetter Woodington soils, and more clayey Lynchburg soils. These included soils make up less than 20 percent of most mapped areas.

Most areas of this soil are cultivated. The rest are in pasture or woodland.

Stallings soil is suited to growing row crops, such as corn and soybeans. Wetness is the main limitation.

This soil is well suited to grasses and legumes. Wetness is the main limitation. If this soil is used for pasture, proper stocking rates, pasture rotation, timely deferment of grazing, and restricted use during wet periods help to keep the pasture and soil in good condition.

This soil is suited to loblolly pine. The dominant trees are loblolly pine, sweetgum, water oak, maple, and blackgum. The main understory includes holly, blueberry, greenbrier, sourwood, and switchcane. Wetness restricts the use of equipment.

This soil is poorly suited to most urban uses because of wetness and seepage. It is suited to most recreational uses. Wetness is the main limitation.

This soil is in capability subclass IIw and woodland suitability group 3w.

TaB—Tarboro loamy sand, 0 to 6 percent slopes. This somewhat excessively drained soil is on terraces of the Cape Fear River, Rockfish Creek, and Lower Little River. It is in Cumberland County. Individual areas of this unit are long and narrow in shape and are oriented parallel to the stream channel. They range from 5 to 40 acres in size.

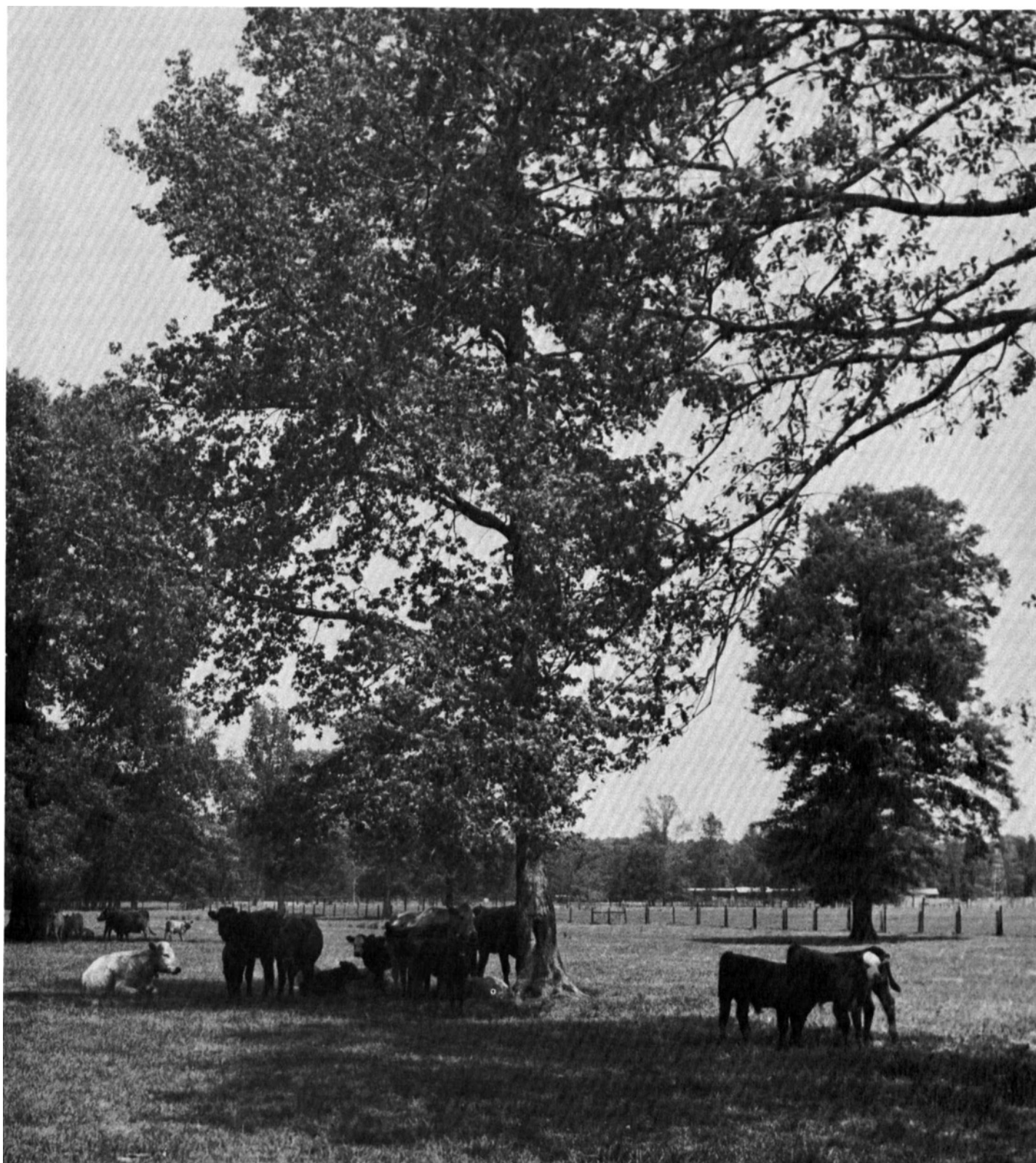


Figure 8.—Grazing the proper number of stock helps maintain pasture on Roanoke and Wahee loams.

Typically, the surface layer is dark brown loamy sand 10 inches thick. The underlying material to a depth of 82 inches is strong brown, brownish yellow, or yellow sand.

Permeability is rapid, and available water capacity is low. Reaction ranges from strongly acid through slightly acid in all horizons, except where the surface has been limed. This soil is subject to rare flooding.

Included with this soil in mapping are small areas of similar soils that have layers of sandy loam or sandy clay loam. These layers are 40 to 72 inches below the surface. Small areas of soils that have slopes of more than 6 percent are also included. These included soils make up less than 20 percent of most mapped areas.

Most areas of this soil are used for cultivated crops or pasture. The rest are in woodland.

Tarboro soil is poorly suited to growing cultivated crops, such as corn, soybeans, and small grains. The main limitations are low available water capacity and leaching of plant nutrients. Minimum tillage, crop residue management, and including close-growing grasses and legumes in the cropping system help to prevent wind erosion, reduce leaching, and conserve moisture. Using this soil for hay and pasture is a good conservation alternative. Forage production is limited by low available water. Bahiagrass and Coastal or common bermudagrass are adapted to this soil.

This soil is suited to longleaf and loblolly pines. The dominant trees are loblolly pine, longleaf pine, southern red oak, white oak, turkey oak, and hickory. The understory includes holly, dogwood, sourwood, and sassafras. The deep sand can restrict the use of equipment, and the low available water capacity can limit the survival and growth of seedlings.

This soil is suited to most urban and recreational uses. Rare flooding and seepage are the main limitations. Because of droughtiness, landscape management commonly includes frequent applications of fertilizer and water during dry periods.

This soil is in capability subclass IIIs and woodland suitability group 4s.

TR—Torhunta and Lynn Haven soils. These nearly level, very poorly drained and poorly drained soils are on low flats and in slight depressions of uplands. They are most extensive in the southeastern part of Cumberland County. Because of similarities of position on the landscape, use, and management, these two soils were not separated in mapping.

Most areas of this unit consist of large, wet flats. Vegetation is thick, with almost impenetrable undergrowth; therefore, the soils were examined mostly along canals, trails, and logging roads. In selected areas, transects were made across the land and borings were made at specific points to verify the soils. The boundaries of the soils were drawn from limited field observations, using aerial photographs as aids for interpretation. Although this unit was mapped with fewer

detailed observations than were most other units in the survey, the resulting delineations meet the needs for the major anticipated uses of the soils.

This unit contains about 60 percent Torhunta soil, 20 percent Lynn Haven soil, and 20 percent soils of minor extent. Some mapped areas are made up of both Torhunta and Lynn Haven soils, while others are made up of only one of them. Mapped areas are oval or irregular in shape and range from 5 to 200 acres in size.

Typically, Torhunta soil has a surface layer of black fine sandy loam 7 inches thick. The subsurface layer is very dark gray fine sandy loam 7 inches thick. The subsoil is fine sandy loam 32 inches thick. The upper part of the subsoil is dark gray, and the lower part is gray. The underlying material to a depth of 72 inches is gray loamy sand.

Typically, Lynn Haven soil has a surface layer of black sand 10 inches thick. The subsurface layer is gray sand 5 inches thick. The subsoil is sand 41 inches thick. The upper part is very dark brown, the middle part is black, and the lower part is very dark brown. The underlying material to a depth of 80 inches is dark grayish brown sand.

Permeability of the Torhunta soil is moderately rapid, and permeability of the Lynn Haven soil is moderate to moderately rapid. Reaction in both soils ranges from extremely acid through strongly acid. The seasonal high water table is at or near the surface for long periods during the winter and early spring. Ponding can occur in some areas. In some low-lying areas near streams, these soils are subject to rare flooding.

Minor soils in this unit are small areas of Woodington soils, which are similar to Torhunta soils but are better drained, and small areas of Leon soils, which are similar to Lynn Haven soils but do not have a thick, black surface layer. Also there are small areas of better drained Pactolus and Stallings soils and small areas of Croatan soils, which have an organic surface layer. These minor soils make up about 20 percent of the unit.

Most areas of this unit are in woodland. A few areas have been cleared and are used to grow corn and soybeans.

These soils are poorly suited to growing cultivated crops, such as corn and soybeans. Wetness is the main limitation. If drained, areas of Torhunta soils can produce good yields. Drainage outlets, however, often are not readily available. Areas of Lynn Haven soils, even if drained, are poorly suited to growing most row crops because of very low available water during the growing season. Some varieties of blueberries grow well on Lynn Haven soils.

If drained, these soils are suited to grasses and legumes for hay and pasture. In areas used for pasture, proper stocking rates, pasture rotation, and restricted use during wet seasons help to keep the pasture and soil in good condition.

These soils are suited to hardwoods and pines. The dominant trees are red maple, sweetbay, blackgum, loblolly pine, and sweetgum. The understory includes swamp cyrilla, waxmyrtle, fetterbush lyonia, and switchcane. Wetness is the main limitation.

These soils are poorly suited to nearly all urban and recreational uses. Wetness is the main limitation.

Torhunta soil is in capability subclass VIw and woodland suitability group 2w, and Lynn Haven soil is in capability subclass IVw and woodland suitability group 3w.

Ud—Udorthents, loamy. This map unit consists of areas where the soil has been removed. These borrow areas range from 3 acres to more than 40 acres in size. Small borrow pits less than 3 acres in size are shown by a special symbol.

The borrow pits range in depth from 5 to 20 feet. They were dug for fill material, road base material, clay, or sand. There are numerous small borrow pits on Fort Bragg. These borrow pits are less than 10 acres. They are sources of material to build roadbeds. Several large borrow pits in Cumberland County resulted from removal of material for construction of Interstate 95. One large pit near the town of Slocumb was the source of clay for use in an adjacent, brick manufacturing plant.

This map unit is so variable that most soil interpretations require onsite investigation. Many borrow pits contain small, scattered bodies of water. Many older borrow pits support vegetation, such as pines and shrubs.

This unit was not assigned to a capability subclass or to a woodland suitability group.

Ur—Urban land. This map unit consists of areas that are more than 85 percent urban. These areas are covered by buildings, houses, streets, parking lots, and other such urban uses. Because of the extensive urbanization, the natural soils have been altered, and the topography and original landscape have been changed. Slope is commonly 0 to 6 percent.

Most of the Urban land is in and around the city of Fayetteville. Significant areas are at Fort Bragg and Pope Air Force Base. These areas are irregular in shape and range from 100 acres to more than 300 acres in size. There are other areas of Urban land, 10 to 20 acres in size, in and around Fayetteville and smaller towns in the county. Several large manufacturing sites are mapped as Urban land.

Nearly all of the precipitation that falls on this unit runs off. This increases the flooding hazard in low-lying areas. There is a hazard of waterway and reservoir siltation from areas that are graded but not stabilized.

Recommendations for use and management of soil and water in this unit require onsite investigation.

This unit has not been assigned to a capability subclass or a woodland suitability group.

VaB—Vaucluse loamy sand, 2 to 8 percent slopes.

This well drained soil is on side slopes and narrow ridges of uplands. It is mostly in the northern and western parts of Cumberland and Hoke Counties. Individual areas of this unit are irregular in shape and range from 5 acres to more than 100 acres in size.

Typically, the surface layer is dark grayish brown loamy sand 4 inches thick. The subsurface layer is yellowish brown loamy sand 5 inches thick. The subsoil is 51 inches thick. The upper part is yellowish red sandy clay loam. The middle part is red sandy clay loam that is brittle when dry. The lower part is yellowish red sandy clay loam. The underlying material to a depth of 73 inches is reddish yellow sandy loam.

Permeability is moderately slow in the upper part of the subsoil and slow in the lower part. Available water capacity is low. Reaction ranges from extremely acid through strongly acid in all horizons, except where the surface has been limed. The hazard of erosion is moderate where the soil is exposed.

Included with this soil in mapping are small areas of more clayey Gilead soils and sandier Blaney and Candor soils. Also included are areas of eroded soils that have a gravelly surface layer. These included soils make up less than 20 percent of most mapped areas.

Most areas of this soil are in woodland. The rest are in cultivated crops or pasture.

Vaucluse soil is suited to growing cultivated crops, such as corn, soybeans, and tobacco. Susceptibility to erosion and a shallow rooting depth caused by the brittle layer in the subsoil are the main limitations. Minimum tillage, stripcropping, contour cultivation, grassed waterways, cover crops, and including grasses and legumes in the cropping system are practices that reduce runoff and control erosion.

This soil is suited to grasses and legumes. Using this soil for pasture or hay is also effective in controlling erosion. Proper stocking rates and pasture rotation help to reduce compaction and to keep the pasture and soil in good condition.

This soil is suited to loblolly pine. The dominant trees are loblolly pine, longleaf pine, white oak, and southern red oak. The main understory includes dogwood, sourwood, holly, and threeawn.

Vaucluse soil is suited to most urban and recreational uses. Slow permeability is the main limitation.

This soil is in capability subclass IIIs and woodland suitability group 3o.

VaD—Vaucluse loamy sand, 8 to 15 percent slopes.

This well drained soil is on side slopes of uplands. It is mostly in the northern and western parts of Cumberland and Hoke Counties. Individual areas of this

unit are irregular in shape and range from 5 acres to more than 80 acres in size.

Typically, the surface layer is dark grayish brown loamy sand 4 inches thick. The subsurface layer is yellowish brown loamy sand 5 inches thick. The subsoil is 51 inches thick. The upper part is yellowish red sandy clay loam, the middle part is red sandy clay loam, and the lower part is yellowish red sandy clay loam. The underlying material to a depth of 73 inches is reddish yellow sandy loam.

Permeability is moderately slow in the upper part of the subsoil and slow in the lower part. Reaction ranges from extremely acid through strongly acid in all horizons, except where the surface has been limed. The hazard of erosion is severe where the soil is exposed.

Included with this soil in mapping are areas of a soil that is eroded and has a surface layer of gravelly loamy sand. Also included are more clayey Gilead soils and sandier Blaney and Candor soils. These included soils make up less than 20 percent of most mapped areas.

Most areas of this soil are in woodland. A small acreage is in pasture or in cultivated crops.

Vaucluse soil is poorly suited to growing cultivated crops. The main limitation is susceptibility to erosion. If this soil is used for row crops, such practices as minimum tillage, contour farming, stripcropping, grassed waterways, crop residue management, and including grasses and legumes in the cropping system help to reduce runoff and to control erosion.

This soil is suited to grasses and legumes for hay and pasture. Using this soil for pasture is a good way of controlling erosion.

This soil is suited to loblolly pine. The dominant trees are loblolly pine, longleaf pine, white oak, and red oak. The main understory includes dogwood, sourwood, holly, and threeawn.

This soil is suited to most urban and recreational uses. Slope is a limitation to building site development. Erosion from areas where the soil has been disturbed can be a problem. To help prevent this, vegetative cover must be established as soon after soil disturbance as possible. This soil has severe limitations for onsite sewage disposal. The restricting factors are slow permeability of the brittle layer in the subsoil and steepness of slope.

This soil is in capability subclass IVe and woodland suitability group 3o.

VgE—Vaucluse-Gilead loamy sands, 15 to 25 percent slopes. This map unit consists of areas of Vaucluse soil and Gilead soil on long, narrow side slopes of uplands. This unit is most extensive in the northern and western parts of Cumberland and Hoke Counties. Individual areas of this unit are long and narrow in shape and range from 5 acres to more than 40 acres in size. These two soils are so intricately mixed and so similar in use and management that they were not separated in mapping. This unit consists of about 40

percent Vaucluse soil, 35 percent Gilead soil, and 25 percent soils of minor extent.

Typically, Vaucluse soil has a surface layer of dark grayish brown loamy sand 4 inches thick. The subsurface layer is yellowish brown loamy sand 5 inches thick. The subsoil is 51 inches thick. It is yellowish red sandy clay loam in the upper part, red sandy clay loam in the middle part, and yellowish red sandy clay loam in the lower part. The underlying material to a depth of 73 inches is reddish yellow sandy loam.

Typically, Gilead soil has a surface layer of dark gray loamy sand 4 inches thick. The subsurface layer is light yellowish brown loamy sand 9 inches thick. The subsoil to a depth of 70 inches is brownish yellow sandy clay in the upper part; mottled strong brown, brownish yellow, and light gray sandy clay in the middle part; and reddish yellow sandy loam in the lower part.

Permeability of Vaucluse and Gilead soils is moderately slow to slow. Available water capacity is low to medium. Reaction ranges from extremely acid through strongly acid in all horizons, except where the surface has been limed. The hazard of erosion is severe where the soil is exposed. A perched water table is above the brittle layers in the subsoil for brief periods during wet seasons.

Included with these soils in mapping are small areas of sandier Blaney and Candor soils and small areas similar to Vaucluse and Gilead soils, except for the gravelly surface layer. Also included are small seep areas where water draining from the uplands comes to the surface. This unit has numerous areas where the soil mass has slipped downslope. This has exposed short, vertical walls consisting of massive, gray clay. These vertical faces typically are less than 15 feet high.

Nearly all areas of this unit are in native woodland, mostly loblolly pine, oaks, and hickories.

These soils are suited to hardwood and pine. The dominant trees are loblolly pine, longleaf pine, white oak, and southern red oak. The main understory includes dogwood, sourwood, holly, and threeawn.

These soils are poorly suited to farming and to urban and recreational uses. Slope and slow permeability are the main limitations.

These soils are in capability subclass VIe and woodland suitability group 3o.

WaB—Wagram loamy sand, 0 to 6 percent slopes. This well drained soil is on broad, smooth flats and side slopes of uplands. It is throughout the survey area. Individual areas of this unit are irregular in shape and range from 5 to 300 acres in size.

Typically, the surface layer is grayish brown loamy sand 8 inches thick. The subsurface layer is pale brown loamy sand 17 inches thick. The subsoil to a depth of 72 inches is yellowish brown sandy clay loam.

Permeability is moderately rapid, and available water capacity is low to medium. Reaction is very strongly acid

or strongly acid throughout the soil, except where the surface has been limed.

Included with this soil in mapping are small areas of sandier Autryville and Candor soils and Fuquay soils, which contain more than 5 percent plinthite in the subsoil. Also included are small areas of less sandy Norfolk and Faceville soils and Goldsboro soils, which are wetter and less sandy. Typically, only two or three of these included soils are in any one mapped area, and they make up less than 20 percent of most delineations.

Most areas of this soil are in cultivated crops. The rest are in pasture or woodland.

Wagram soil is suited to cultivated crops, such as corn, soybeans, tobacco, and truck crops or to grasses and legumes for hay and pasture. If this soil is used for cultivated crops, minimum tillage, crop residue management, winter cover crops, and windbreaks can be used to control wind erosion, to reduce leaching of plant nutrients, and to conserve moisture.

This soil is suited to loblolly pine, longleaf pine, white oak, southern red oak, and hickory. The main understory includes dogwood, sassafras, and waxmyrtle.

This soil is well suited to most urban uses. Because of droughtiness, landscape management commonly includes frequent applications of fertilizer and irrigation water during long, dry periods. This soil is suited to most recreational uses. The thick, sandy surface layer can limit some types of recreational uses.

This soil is in capability subclass II_s and woodland suitability group 3_s.

WgB—Wagram-Urban land complex, 0 to 8 percent slopes. This map unit consists of areas of Wagram soil and areas of Urban land that are too small and too intermingled to be mapped separately. About 40 to 50 percent of the unit is Wagram soil and about 30 to 40 percent is Urban land. This map unit is most extensive in and around the city of Fayetteville. Mapped areas are 10 acres to more than 250 acres in size and are irregular in shape.

Typically, Wagram soil has a surface layer of grayish brown loamy sand 8 inches thick. The subsurface layer is pale brown loamy sand 17 inches thick. The subsoil to a depth of 72 inches is yellowish brown sandy clay loam.

Permeability is moderately rapid, and available water capacity is low to medium. Reaction is very strongly acid or strongly acid throughout the soil, except where the surface has been limed.

Urban land consists of areas where the original soil has been covered by concrete, asphalt, buildings, or other impervious surfaces. Slope is modified to fit the site and commonly ranges from 0 to 4 percent.

Included in this unit are small areas of Autryville and Candor soils, which are sandier than Wagram soil, and small areas of Norfolk and Faceville soils, which are less sandy than Wagram soil. Also included are small areas of Fuquay soils, which contain more than 5 percent

plinthite in the subsoil. Some delineations contain small areas of the wetter, less sandy Goldsboro soils, which usually are in small depressions. These included soils make up 10 to 20 percent of most mapped areas.

Undeveloped areas of this soil are being converted to urban uses very rapidly. This map unit is well suited to most urban and recreational uses. Because of droughtiness, landscape management commonly includes frequent applications of fertilizer and irrigation water during long, dry periods. The thick, sandy surface layer can limit some types of recreational uses.

This unit has not been assigned to a capability subclass or a woodland suitability group.

WmB—Wickham fine sandy loam, 1 to 6 percent slopes. This well drained soil is on slightly convex ridges of stream terraces along the Cape Fear River, Lower Little River, and Rockfish Creek. This soil is in Cumberland County. Individual areas of this unit are generally long and narrow in shape and parallel to the stream channel. Mapped areas range from 5 to 50 acres in size.

Typically, the surface layer is dark brown fine sandy loam 7 inches thick. The subsoil is 39 inches thick. It is red sandy clay loam in the upper part and yellowish red sandy loam in the lower part. The underlying material to a depth of 80 inches is yellowish red loamy sand in the upper part and strong brown sand in the lower part.

Permeability is moderate, and available water capacity is medium. Reaction ranges from very strongly acid through medium acid in all horizons, except where the surface has been limed. The hazard of erosion is moderate. Wickham soil is subject to rare flooding.

Included with this soil in mapping are small areas of sandier Tarboro soils; wetter Altavista soils; and wetter, more clayey Dogue, Roanoke, and Wahee soils. Tarboro soils are on higher ridges, Altavista and Dogue soils are in slight depressions, and Roanoke and Wahee soils are along drainageways. These included soils make up less than 20 percent of most mapped areas.

Most areas of this soil are in cultivated crops or pasture, and the rest are mostly in woodland. A few small areas are urban.

Wickham soil is well suited to growing cultivated crops, such as corn, soybeans, tobacco, and small grains, or to grasses and legumes for hay and pasture. Susceptibility to erosion is the main limitation. Minimum tillage, winter cover crops, stripcropping, field borders, farming on the contour, and crop residue management help to reduce surface runoff and maintain tilth. The use of this soil for pasture maintains constant cover and is a good way to reduce erosion.

This soil is well suited to hardwoods and pines. The dominant trees are loblolly pine, red maple, hickory, yellow-poplar, black tupelo, American elm, American beech, southern red oak, water oak, and white oak. The

understory includes dogwood, sassafras, sourwood, and waxmyrtle.

This soil is suited to most urban and recreational uses. Rare flooding is the main limitation.

This soil is in capability subclass IIe and woodland suitability group 2o.

WnB—Wickham-Urban land complex, 1 to 6 percent slopes. This map unit consists of areas of Wickham soil and areas of Urban land that are too small and too intermingled to be mapped separately. About 40 to 50 percent of this unit is undisturbed Wickham soil and about 30 to 40 percent is Urban land. This unit is most extensive on the east side of Fayetteville.

Typically, Wickham soil has a surface layer of dark brown fine sandy loam 7 inches thick. The subsoil is 39 inches thick. It is red sandy clay loam in the upper part and yellowish red sandy loam in the lower part. The underlying material to a depth of 80 inches is yellowish red loamy sand in the upper part and strong brown sand in the lower part.

Permeability is moderate, and available water capacity is medium. Reaction ranges from very strongly acid through medium acid in all horizons, except where the surface has been limed. Wickham soil is subject to rare flooding.

Urban land consists of areas where the original soil has been covered by concrete, asphalt, buildings, or other impervious surfaces. The slope of Urban land is modified to fit the site and commonly ranges from 0 to 4 percent.

Included with this unit in mapping are small areas of wetter Altavista soils and wetter, more clayey Dogue, Roanoke, and Wahee soils. Also included are a few small areas of sandier Tarboro soils. Tarboro soils are on higher ridges, Altavista and Dogue soils are in slight depressions, and Roanoke and Wahee soils are along drainageways. These included soils make up 10 to 20 percent of most mapped areas.

This map unit is suited to most urban and recreational uses. The main limitations are susceptibility to erosion and rare flooding. Revegetating disturbed soils promptly helps to reduce runoff and control erosion. Lawns and shrubs are relatively easy to maintain. Irrigation may be necessary during long, dry periods.

This soil has not been assigned to a capability subclass or a woodland suitability group.

Wo—Woodington loamy sand. This nearly level, poorly drained soil is on broad, smooth low flats and in shallow depressions of uplands. It is most extensive in the eastern part of Cumberland County. Individual areas of this unit are irregular in shape and range from 5 to 100 acres in size.

Typically, the surface layer is very dark gray loamy sand 5 inches thick. The subsurface layer is grayish brown loamy sand 6 inches thick. The subsoil to a depth of 65 inches is gray sandy loam in the upper part and gray loamy sand in the lower part.

Permeability is moderately rapid. Reaction ranges from very strongly acid through medium acid in all horizons, except where the surface has been limed. The seasonal high water table is 0.5 to 1 foot below the surface during winter and early spring.

Included with this soil in mapping are small areas of more clayey Rains soils; better drained Stallings soils; better drained, more clayey Lynchburg soils; and wetter Torhunta soils. These included soils make up less than 20 percent of most mapped areas.

Most areas of this soil are in woodland. The rest are in pasture or cultivated crops.

Woodington soil is suited to growing cultivated crops, such as corn and soybeans. Artificial drainage is needed for optimum production of most crops.

This soil is suited to grasses and legumes for hay and pasture. Wetness is the main limitation. If this soil is used for pasture, proper stocking rates, pasture rotation, timely deferment of grazing, and restriction of use during wet periods help to keep the pasture and soil in good condition.

This soil is suited to hardwoods and pines. The dominant trees are loblolly pine, sweetgum, water oak, maple, and blackgum. The main understory includes holly, blueberry, greenbrier, sourwood, and switchcane. Wetness can restrict the use of equipment.

This soil is poorly suited to nearly all urban and recreational uses. Wetness is the main limitation.

This soil is in capability subclass VIw and woodland suitability group 3w.

Use and Management of the Soils

This soil survey is an inventory and evaluation of the soils in the survey area. It can be used to adjust land uses to the limitations and suitabilities of natural resources and the environment. Also, it can help avoid soil-related failures in land uses.

In preparing a soil survey, soil scientists, conservationists, engineers, and others collect extensive field data about the nature and behavior characteristics of the soils. They collect data on erosion, droughtiness, flooding, and other factors that affect various soil uses and management. Field experience and collected data on soil properties and performance are used as a basis in predicting soil behavior.

Information in this section can be used to plan the use and management of soils for crops and pasture; as rangeland and woodland; as sites for buildings, sanitary facilities, highways and other transportation systems, and parks and other recreation facilities; and for wildlife habitat. It can be used to identify the potentials and limitations of each soil for specific land uses and to help prevent construction failures caused by unfavorable soil properties.

Planners and others using soil survey information can evaluate the effect of specific land uses on productivity and on the environment in all or part of the survey area. The survey can help planners to maintain or create a land use pattern in harmony with the natural soil.

Contractors can use this survey to locate sources of sand and gravel, roadfill, and topsoil. They can use it to identify areas where wetness can cause difficulty in excavation.

Health officials, highway officials, engineers, and others may also find this survey useful. The survey can help them plan the safe disposal of wastes and locate sites for pavements, sidewalks, campgrounds, playgrounds, lawns, and trees and shrubs.

Crops and Pasture

Foy D. Hendrix, agronomist, Soil Conservation Service, helped prepare this section.

General management needed for crops and pasture is suggested in this section. The crops or pasture plants best suited to the soils are identified; the system of land capability classification used by the Soil Conservation Service is explained; and the estimated yields of the

main crops and hay and pasture plants are listed for each soil in table 5.

Planners of management systems for individual fields or farms should consider the detailed information given in the description of each soil under "Detailed soil map units." Specific information can be obtained from the local office of the Soil Conservation Service or the Cooperative Extension Service.

In 1977, about 130,000 acres was used for row crops in Cumberland and Hoke Counties. This figure is based on the 1978 North Carolina Land Utilization Survey from the North Carolina Crop and Livestock Reporting Service. Cumberland County farmers harvested more than 70,000 acres in 1977. Hoke County farmers harvested more than 50,000 acres during the same year. Soybeans and corn were grown on more than 75 percent of the acreage in the two counties. Based on cash income, however, flue-cured tobacco is the most important crop. Truck crops are becoming more important, especially in the eastern part of Cumberland County. Commonly grown crops include sweet potatoes, cabbage, canteloupes, watermelons, cucumbers, snapbeans, and tomatoes.

Farming in the survey area is following a nationwide pattern. The size of farms is increasing, and the number of farms is decreasing. Farmers are cultivating an increasing acreage by using more and better machinery and by using other advances in agricultural technology. Many areas of woodland have been cleared to grow row crops during the past few years. This has caused a slight increase in cropped acreage for Hoke County. Loss of cropland to urban growth in Cumberland County, however, has more than offset any additions of cropland from woodland conversion. Therefore, cropland acreage has decreased slightly.

The soils in the survey area vary greatly in their suitability for specific crops and in their management requirements. Some of the soils can be placed together for purposes of discussion. They have similar dominant management practices needed for growing crops common to the survey area.

Control of wetness.—Wetness is a limitation on about 30 percent of the acreage suitable for farming in Cumberland and Hoke counties. Excess water is removed by surface ditches, by pipelines placed beneath the soil surface, or by a combination of both (fig. 9). Land smoothing is used in some areas to remove low



Figure 9.—An open surface ditch drains water from recently cleared area of Pantego loam.

spots where water collects. The kind of water management system used varies with the kind of soil.

The loamy soils, such as Rains, Lynchburg, and Pantego soils, respond well to subsurface drainage. In contrast, the clayey soils, such as Byars, Cape Fear, Coxville, Craven, Dogue, Dunbar, Duplin, Lenoir, McColl, Roanoke, and Wahee soils, usually require open-ditch drainage. Open ditches do not function well in soils that have a high content of sand, such as those in the Stallings, Pactolus, Leon, Lynn Haven, Torhunta, and Woodington series. Ditches in these soils are very susceptible to caving and filling. Only limited drainage practices are needed on moderately well drained Altavista, Dogue, Exum, Craven, and Goldsboro soils.

Control of erosion.—Controlling wind and water erosion is necessary on many of the soils in the survey area. Water erosion is a hazard on about 6 percent of the cropland. Gently sloping or sloping Aycock, Craven, Gilead, Norfolk, Vacluse, and Wickham soils are subject to erosion by water. Diversions, grassed waterways, field borders, conservation tillage, using crop residue on the surface, and planting close-growing crops are practices that control water erosion. A combination of practices is needed when such crops as corn, soybeans, or tobacco are grown on sloping soils. Row crops are not usually

grown on the strongly sloping to moderately steep Gilead and Vacluse soils.

Wind erosion is a hazard on about 50 percent of the cropland in the survey area. Autryville, Blaney, Candor, Fuquay, Kenansville, Lakeland, Tarboro, and Wagram soils are susceptible to wind erosion. Leaving the surface covered with crop residue or growing a cover crop until planting time helps to reduce wind erosion. These are also effective ways to conserve moisture and reduce nutrient leaching on these droughty, infertile soils. Windbreaks are used to reduce wind erosion on large, open areas of sandy soils (fig. 10). Leaving strips of small grains between corn or tobacco rows reduces the destructive effect of blowing sand on young seedlings. Many acres of corn, soybeans, tobacco, and truck crops are grown on soils subject to wind erosion.

Maintenance of soil fertility.—None of the soils in Cumberland and Hoke Counties have enough natural fertility to produce economic returns on crops. These soils are naturally acid and require additions of lime to make them usable for most crops. Soils used for blueberries are an exception. No benefit is obtained from liming. Blueberries show a negative response to lime unless the pH is less than 3.5.

Liming requirements are perhaps the first concern for a farmer, because the acidity level in the soil affects the availability of many nutrients to plants and influences the activity of beneficial bacteria. Lime also provides calcium (Ca) and, when dolomitic lime is used, magnesium (Mg). The addition of lime neutralizes exchangeable aluminum (Al) and, thereby, counteracts the adverse effects of aluminum on many important crops grown in the county.

Liming requirements are based upon soil tests and species of crop to be grown. In soils that have a sandy surface texture, calcium and magnesium levels may be low. Only a soil test can indicate whether calcitic or dolomitic lime should be used. Also, the desired pH levels differ depending upon the soil properties and the crop to be grown. All of these are considered in the recommendations available through soil testing.

Nitrogen is required for all crops, except generally for peanuts, clovers, some rotations of soybeans, and alfalfa after it has been established. No soil test is available for predicting nitrogen requirements. Appropriate rates are discussed in the "Yields per acre" section. Because nitrogen can be readily leached from sandy soils, more than one application may be necessary during the growing season.

The need for phosphorous fertilizers can be predicted from soil tests. Phosphate requirements for specific crops must be determined by sampling each field. In Cumberland and Hoke Counties, testing the soil in each field is important because past fertilizer applications tend to build up in the soil.

Potassium needs are determined by soil tests.



Figure 10.—A windbreak of loblolly pines helps reduce wind erosion on Lakeland sand, 1 to 8 percent slopes.

Control of weeds.—The use of herbicides to control weeds is a common practice in the survey area. Successful use results in less tillage and is an integral part of modern farming. Soil properties, such as organic matter content and texture of the surface layer, affect the rate of application. Table 15 estimates the general range of organic matter content, and table 14 gives the surface texture for each soil.

In some cases, the organic matter content projected for the different soils may be outside the range shown in the table. Higher ranges occur in soils that have received high amounts of animal or other organic waste. Newly cultivated soil may have higher levels of organic matter content in their surface layer than soils that have been under cultivation for a long period of time. Using

conservation tillage may also increase organic matter content in the surface layer. Lower levels of organic matter are common in soils where the surface layer has been partly or completely removed by erosion or by land smoothing. Current soil tests should be used for specific organic matter determinations.

Rapid leaching of herbicides may damage young plants or prevent normal seed germination in sandy soils that have less than 2 percent organic matter. The effectiveness of herbicides commonly decreases as the organic matter level exceeds 6 to 10 percent.

For specific herbicide rates based on organic matter content and surface texture, read the label.

Pasture management.—Soil loss can be reduced on soils subject to wind and water erosion by using the soil

for pasture or hayland. In 1977, about 10,000 acres in the survey area was used for pasture. Coastal bermudagrass is grown on such droughty soils as Lakeland and Candor. Many acres of sandy soils that are now idle would be pasture grass on such wet, clayey soils as Roanoke, Wahee, Dogue, and Cape Fear. Drainage usually is necessary for optimum production and use.

Yields Per Acre

The average yields per acre that can be expected of the principal crops under a high level of management are shown in table 5. In any given year, yields may be higher or lower than those indicated in the table because of variations in rainfall and other climatic factors.

The yields are based mainly on the experience and records of farmers, conservationists, and extension agents. Available yield data from nearby counties and results of field trials and demonstrations are also considered.

The management needed to obtain the indicated yields of the various crops depends on the kind of soil and the crop. Management can include drainage, erosion control, and protection from flooding; the proper planting and seeding rates; suitable high-yielding crop varieties; appropriate and timely tillage; control of weeds, plant diseases, and harmful insects; favorable soil reaction and optimum levels of nitrogen, phosphorus, potassium, and trace elements for each crop; effective use of crop residue, animal manure, and green-manure crops; and harvesting that insures the smallest possible loss.

A high level of management includes maintaining proper soil reaction and fertility levels as indicated by standard soil tests. Nitrogen rates for corn on soils which have a yield potential of 125 to 150 bushels per acre should be 140 to 160 pounds of nitrogen per acre. Where the yield potential is only 100 bushels per acre, rates of 100 to 120 pounds of nitrogen per acre should be used. Application of nitrogen in excess of potential yields is not usually a sound practice. Excess fertilizer not used by a crop can be a source of pollution if it is washed into streams or leached into ground water, as well as being expensive. Where corn or cotton follows soybeans or peanuts in a cropping system, nitrogen rates can be reduced 20 to 30 pounds per acre.

For yields of irrigated crops, it is assumed that the irrigation system is adapted to the soils and to the crops grown, that good quality irrigation water is uniformly applied as needed, and that tillage is kept to a minimum.

The estimated yields reflect the productive capacity of each soil for each of the principal crops. Yields are likely to increase as new production technology is developed. The productivity of a given soil compared with that of other soils, however, is not likely to change.

Crops other than those shown in table 5 are grown in the survey area, but estimated yields are not listed because the acreage of such crops is small. The local

office of the Soil Conservation Service or of the North Carolina Agricultural Extension Service can provide information about the management and productivity of the soils for those crops.

Land Capability Classification

Land capability classification shows, in a general way, the suitability of soils for most kinds of field crops. Crops that require special management are excluded. The soils are grouped according to their limitations for field crops, the risk of damage if they are used for crops, and the way they respond to management. The grouping does not take into account major and generally expensive landforming that would change slope, depth, or other characteristics of the soils, nor does it consider possible but unlikely major reclamation projects. Capability classification is not a substitute for interpretations designed to show suitability and limitations of groups of soils for woodland and for engineering purposes.

In the capability system, soils are generally grouped at two levels: capability class and subclass. These levels are defined in the following paragraphs.

Capability classes, the broadest groups, are designated by Roman numerals I through VIII. The numerals indicate progressively greater limitations and narrower choices for practical use. The classes are defined as follows:

Class I soils have slight limitations that restrict their use.

Class II soils have moderate limitations that reduce the choice of plants or that require moderate conservation practices.

Class III soils have severe limitations that reduce the choice of plants or that require special conservation practices, or both.

Class IV soils have very severe limitations that reduce the choice of plants or that require very careful management, or both.

Class V soils are not likely to erode but have other limitations, impractical to remove, that limit their use.

Class VI soils have severe limitations that make them generally unsuitable for cultivation.

Class VII soils have very severe limitations that make them unsuitable for cultivation.

Class VIII soils and miscellaneous areas have limitations that nearly preclude their use for commercial crop production.

Capability subclasses are soil groups within one class. They are designated by adding a small letter, *e*, *w*, or *s*, to the class numeral, for example, IIe. The letter *e* shows that the main limitation is risk of erosion unless close-growing plant cover is maintained; *w* shows that water in or on the soil interferes with plant growth or cultivation (in some soils the wetness can be partly corrected by artificial drainage); and *s* shows that the soil is limited mainly because it is shallow or droughty.

In class I there are no subclasses because the soils of this class have slight limitations. Class V contains only the subclasses indicated by *w* or *s* because the soils in class V are subject to little or no erosion. They have other limitations that restrict their use to pasture, rangeland, woodland, wildlife habitat, or recreation.

The acreage of soils in each capability class and subclass is shown in table 6. The capability classification of each map unit is given in the section "Detailed Soil Map Units."

Important Farmland

Many of the soils in Cumberland and Hoke Counties have a long history of agricultural uses. There is much interest in the relative value of the soils for these uses. To provide information about the farmland in Cumberland and Hoke Counties, based on definitions provided by the U. S. Department of Agriculture, the soils are identified as "Prime Farmland" and "State and Locally Important Farmland". The location of each listed map unit is shown on the detailed maps in the back of this publication and the acreage of each unit is shown in table 4. Information about soil qualities that affect use and management is in the section "Soil Maps for Detailed Planning". This does not constitute a recommendation for a particular land use.

Prime farmland, as defined by the U.S. Department of Agriculture, is soils that are best suited to producing food, feed, forage, fiber, and oilseed crops. Such soils have qualities that are favorable for the economic production of sustained high yields of crops. The soils need only to be treated and managed using acceptable farming methods. The moisture supply, of course, must be adequate, and the growing season has to be sufficiently long. Prime farmland produces high yields with minimal inputs of energy and economic resources, and farming these soils results in the least damage to the environment.

Prime farmland may presently be used as cropland, pasture, or woodland, or other land. It is either used for producing food or fiber or is available for these uses. Urban and built-up land or water areas cannot be considered prime farmland.

About 15 percent of the survey area meets the soil requirements for prime farmland. About 66,700 acres in Cumberland County is classified prime farmland. This is about 16 percent of the county. About 34,160 acres, or about 14 percent, of Hoke County is prime farmland. The major areas of these soils are in the southern part of Hoke County and the southwestern and eastern parts of Cumberland County. The main crops grown are corn, soybeans, and tobacco.

The loss of prime farmland to other uses puts pressure on marginal lands. In Cumberland and Hoke Counties, these marginal lands usually are limited by wetness or droughtiness.

The map units that meet the soil requirements for prime farmland are:

AaA	Altavista fine sandy loam, 0 to 3 percent slopes
AyB	Aycock loam, 1 to 4 percent slopes
CrB	Craven loam, 1 to 4 percent slopes
DgA	Dogue fine sandy loam, 0 to 2 percent slopes
DhA	Dothan loamy sand, 0 to 2 percent slopes
DpA	Duplin sandy loam, 0 to 3 percent slopes
ExA	Exum loam, 0 to 2 percent slopes
FaA	Faceville loamy sand, 0 to 2 percent slopes
FaB	Faceville loamy sand, 2 to 6 percent slopes
GoA	Goldsboro loamy sand, 0 to 2 percent slopes
KaA	Kalmia loamy sand, 0 to 2 percent slopes
NoA	Norfolk loamy sand, 0 to 2 percent slopes
NoB	Norfolk loamy sand, 2 to 6 percent slopes
WmB	Wickham fine sandy loam, 1 to 6 percent slopes

State and Locally Important Farmland

Farmland of state and local importance consists of soils other than those designated prime farmland. In one or more ways, their characteristics do not meet the requirements for prime farmland. They are suited to producing crops economically, however, when managed according to modern farming methods. This includes management practices, such as drainage, which is needed to control excess water.

Farmland of state and local importance may be in crops, pasture, woodland, or other land, but not urban and built-up land or water areas. It must be used for producing food or fiber or be available for these uses. For detailed information on the criteria used in designating important farmland, consult the local staff of the Soil Conservation Service.

About 27 percent of the survey area meets the soil requirements for farmland of state and local importance. About 127,300 acres in Cumberland County is classified as State and locally important farmland. This is about 30 percent of the county. State and locally important farmland in Hoke County is about 52,820 acres, or about 22 percent of the county. The major areas of these soils are in the southern part of Hoke County and in the southwestern and eastern parts of Cumberland County. The major crops grown are corn and soybeans.

Map units that meet the requirements for State and locally important farmland are:

AuA	Autryville loamy sand, 0 to 2 percent slopes
BuA	Butters loamy sand, 0 to 2 percent slopes
By	Byars loam
Cf	Cape Fear loam
Co	Coxville loam
De	Deloss loam
Dn	Dunbar loam
FuB	Fuquay sand, 0 to 4 percent slopes
Gr	Grantham loam
Ld	Lenoir loam

Ly	Lynchburg sandy loam
Mc	McColl loam
Na	Nahunta loam
Pg	Pantego loam
Ra	Rains sandy loam
Ro	Roanoke and Wahee loams
St	Stallings loamy sand
WaB	Wagram loamy sand, 0 to 6 percent slopes
Wo	Woodington loamy sand

Woodland Management and Productivity

Edwin J. Young, forester, Soil Conservation Service, helped prepare this section.

Woodland is of economic, social, recreational, and environmental importance to Cumberland and Hoke Counties. Wooded areas have aesthetic value and provide habitat for wildlife. Commercial woodland covers 397,675 acres, or 60 percent of the land area. Commercial woodland is defined as land capable of producing crops of industrial wood and is not withdrawn from timber use. Clearing of additional land for agriculture, continuing urban encroachment, and other uses of the land continue to reduce the commercial woodland acreage (10,11).

The forest type is changing from pines to hardwoods on a significant acreage. Current rates of pine regeneration and planting are not replacing mature pine stands now being harvested. When pine stands are cut, understory hardwoods usually dominate the site. Vigorous methods of controlling hardwoods, such as prescribed fire burning or mechanical site preparation, are often used to reestablish pine at the time of cutting. Loblolly pine, the most important timber species in the survey area, brings the highest average value per acre and is relatively easy to establish and manage. It grows on a wide variety of soils: on poorly drained, clayey soils, where "bedding" may be necessary to elevate seedlings above standing water, and on deep, excessively drained sands, where furrowing is needed so that moisture conditions are improved for the seedlings.

Four forest types are identified in the survey area:

1. Loblolly-shortleaf pine makes up 101,737 acres. This type is more than 50 percent pine species and red and white oaks, gum, hickory, and yellow-poplar.

2. Oak-pine makes up 62,924 acres. Hardwoods comprise more than 50 percent of this stand, but pines comprise 25 to 50 percent in association with upland oaks, gum, hickory, and yellow-poplar. This timber type, if left undisturbed, develops into a forest of dominantly oak and other upland hardwoods. The understory in both the loblolly-shortleaf and oak-pine types usually consists of hardwood seedlings and saplings because they are more

tolerant of shade than pine. Hardwoods compete so vigorously for light and moisture with the pine in a shaded understory that few pine seedlings are able to survive. When mature stands of pine are cut, the dense understory of young hardwoods becomes dominant.

3. Oak-hickory makes up 54,587 acres. Upland oaks and hickory comprise more than 50 percent of the stand. Common associates include elm, red maple, and yellow-poplar.

4. Oak-gum-cypress makes up 66,980 acres. This type is divided into two broad types: tupelo-cypress swamps and mixed bottom-land hardwoods. Most of these sites are characterized by an abundant supply of water and include soils formed from both alluvium and residuum. Deep swamps are dominated by water tupelo and baldcypress and have stands of red maple, swamp cottonwood, green ash, and many understory species. Swamp tupelo grows in soils that have a high seasonal water table. Associates include red maple, sweetbay, redbay, and Carolina ash. Water tupelo, baldcypress, and swamp tupelo thrive in saturated soils that are frequently flooded.

Table 7 can be used by woodland owners or forest managers in planning the use of soils for wood crops. Only those soils suitable for wood crops are listed. The table lists the ordination (woodland suitability) symbol for each soil. Soils assigned the same ordination symbol require the same general management and have about the same potential productivity.

The first part of the *ordination symbol*, a number, indicates the potential productivity of the soils for important trees. The number 1 indicates very high productivity; 2, high; 3, moderately high; 4, moderate; and 5, low. The second part of the symbol, a letter, indicates the major kind of soil limitation. The letter *w* indicates excessive water in or on the soil, and the letter *s* indicates sandy texture. The letter *o* indicates that limitations or restrictions are insignificant. If a soil has more than one limitation, the priority is as follows: *w* and *s*.

In table 7, *slight*, *moderate*, and *severe* indicate the degree of the major soil limitations to be considered in management.

Ratings of the *erosion hazard* indicate the risk of loss of soil in well managed woodland. The risk is *slight* if the expected soil loss is small, *moderate* if measures are needed to control erosion during logging and road construction, and *severe* if intensive management or special equipment and methods are needed to prevent excessive loss of soil.

Ratings of *equipment limitation* reflect the characteristics and conditions of the soil that restrict use of the equipment generally needed in woodland management or harvesting. A rating of *slight* indicates that use of equipment is not limited to a particular kind of

equipment or time of year; *moderate* indicates a short seasonal limitation or a need for some modification in management or in equipment; and *severe* indicates a seasonal limitation, a need for special equipment or management, or a hazard in the use of equipment.

Seedling mortality ratings indicate the degree to which the soil affects the mortality of tree seedlings. Plant competition is not considered in the ratings. The ratings apply to seedlings from good stock that are properly planted during a period of sufficient rainfall. A rating of *slight* indicates that the expected mortality is less than 25 percent; *moderate*, 25 to 50 percent; and *severe*, more than 50 percent.

The *potential productivity* of merchantable or *common trees* on a soil is expressed as a *site index*. This index is the average height, in feet, that dominant and codominant trees of a given species attain in a specified number of years. Site index was determined at age 30 years for eastern cottonwood, 35 years for American sycamore, and 50 years for all other species. The site index applies to fully stocked, even-aged, unmanaged stands. Commonly grown trees are those that woodland managers generally favor in intermediate or improvement cuttings. They are selected on the basis of growth rate, quality, value, and marketability.

Trees to plant are those that are suited to the soils and to commercial wood production.

Recreation

The soils of the survey area are rated in table 8 according to limitations that affect their suitability for recreation. The ratings are based on restrictive soil features, such as wetness, slope, and texture of the surface layer. Susceptibility to flooding is considered. Not considered in the ratings, but important in evaluating a site, are the location and accessibility of the area, the size and shape of the area and its scenic quality, vegetation, access to water, potential water impoundment sites, and access to public sewerlines. The capacity of the soil to absorb septic tank effluent and the ability of the soil to support vegetation are also important. Soils subject to flooding are limited for recreation use by the duration and intensity of flooding and the season when flooding occurs. In planning recreation facilities, onsite assessment of the height, duration, intensity, and frequency of flooding is essential.

In table 8, the degree of soil limitation is expressed as slight, moderate, or severe. *Slight* means that soil properties are generally favorable and that limitations are minor and easily overcome. *Moderate* means that limitations can be overcome or alleviated by planning, design, or special maintenance. *Severe* means that soil properties are unfavorable and that limitations can be offset only by costly soil reclamation, special design, intensive maintenance, limited use, or by a combination of these measures.

The information in table 8 can be supplemented by other information in this survey, for example, interpretations for septic tank absorption fields in table 11 and interpretations for dwellings without basements and for local roads and streets in table 10.

Camp areas require site preparation such as shaping and leveling the tent and parking areas, stabilizing roads and intensively used areas, and installing sanitary facilities and utility lines. Camp areas are subject to heavy foot traffic and some vehicular traffic. The best soils have mild slopes and are not wet or subject to flooding during the period of use. The surface absorbs rainfall readily but remains firm and is not dusty when dry. Strong slopes can greatly increase the cost of constructing campsites.

Picnic areas are subject to heavy foot traffic. Most vehicular traffic is confined to access roads and parking areas. The best soils for picnic areas are firm when wet, are not dusty when dry, are not subject to flooding during the period of use, and do not have slopes that increase the cost of shaping sites or of building access roads and parking areas.

Playgrounds require soils that can withstand intensive foot traffic. The best soils are almost level and are not wet or subject to flooding during the season of use. The surface is firm after rains and is not dusty when dry.

Paths and trails for hiking and horseback riding should require little or no cutting and filling. The best soils are not wet, are firm after rains, are not dusty when dry, and are not subject to flooding more than once a year during the period of use. They have moderate slopes.

Golf fairways are subject to heavy foot traffic and some light vehicular traffic. Cutting or filling may be required. The best soils for use as golf fairways are firm when wet, are not dusty when dry, and are not subject to prolonged flooding during the period of use. They have moderate slopes. The suitability of the soil for tees or greens is not considered in rating the soils.

Wildlife Habitat

John P. Edwards, biologist, Soil Conservation Service, helped prepare this section.

The soils of Cumberland and Hoke Counties produce a wide variety of plants that provide food, cover, and protection for many species of wildlife. Upland game species, such as squirrel, rabbit, quail, mourning doves, and fox, and songbirds are abundant throughout the counties. Furbearers, such as raccoon, muskrat, mink, and opossum, also are plentiful. Several species of waterfowl, such as mallards, black ducks, and wood ducks, frequent the Cape Fear River and its tributaries. Large populations of deer are concentrated in the southeastern part of Cumberland County and on Fort Bragg in both Cumberland and Hoke Counties. The Carolina bays, or pocosins, provide habitat for many

species of wildlife. Large populations of the red-cockaded woodpecker, an endangered species, are located on Fort Bragg.

Soils affect the kind and amount of vegetation that is available to wildlife as food and cover. They also affect the construction of water impoundments. The kind and abundance of wildlife depend largely on the amount and distribution of food, cover, and water. Wildlife habitat can be created or improved by planting appropriate vegetation, by maintaining the existing plant cover, or by promoting the natural establishment of desirable plants.

In table 9, the soils in the survey area are rated according to their potential for providing habitat for various kinds of wildlife. This information can be used in planning parks, wildlife refuges, nature study areas, and other developments for wildlife; in selecting soils that are suitable for establishing, improving, or maintaining specific elements of wildlife habitat; and in determining the intensity of management needed for each element of the habitat.

The potential of the soil is rated good, fair, poor, or very poor. A rating of *good* indicates that the element or kind of habitat is easily established, improved, or maintained. Few or no limitations affect management, and satisfactory results can be expected. A rating of *fair* indicates that the element or kind of habitat can be established, improved, or maintained in most places. Moderately intensive management is required for satisfactory results. A rating of *poor* indicates that limitations are severe for the designated element or kind of habitat. Habitat can be created, improved, or maintained in most places, but management is difficult and must be intensive. A rating of *very poor* indicates that restrictions for the element or kind of habitat are very severe and that unsatisfactory results can be expected. Creating, improving, or maintaining habitat is impractical or impossible.

The elements of wildlife habitat are described in the following paragraphs.

Grain and seed crops are domestic grains and seed-producing herbaceous plants. Soil properties and features that affect the growth of grain and seed crops are depth of the root zone, texture of the surface layer, available water capacity, wetness, slope, and flood hazard. Soil temperature and soil moisture are also considerations. Examples of grain and seed crops are corn, wheat, oats, barley, millet, buckwheat, soybeans, cowpeas, and sunflowers.

Grasses and legumes are domestic perennial grasses and herbaceous legumes. Soil properties and features that affect the growth of grasses and legumes are depth of the root zone, texture of the surface layer, available water capacity, wetness, surface stoniness, flood hazard, and slope. Soil temperature and soil moisture are also considerations. Examples of grasses and legumes are fescue, lovegrass, switchgrass, clover, and bahiagrass, trefoil, and crownvetch.

Wild herbaceous plants are native or naturally established grasses and forbs, including weeds. Soil properties and features that affect the growth of these plants are depth of the root zone, texture of the surface layer, available water capacity, wetness, and flood hazard. Soil temperature and soil moisture are also considerations. Examples of wild herbaceous plants are goldenrod, beggarweed, partridgegrass, and pokeweed.

Hardwood trees and woody understory produce nuts or other fruit, buds, catkins, twigs, bark, and foliage. Soil properties and features that affect the growth of hardwood trees and shrubs are depth of the root zone, the available water capacity, and wetness. Examples of these plants are oak, poplar, sweetgum, dogwood, hickory, blackberry, sweetbay, redbay, titi, and blueberry. Examples of fruit-producing shrubs that are suitable for planting on soils rated *good* are Russian-olive, autumn-olive, and crabapple.

Coniferous plants furnish browse and seeds. Soil properties and features that affect the growth of coniferous trees, shrubs, and ground cover are depth of the root zone, available water capacity, and wetness. Examples of coniferous plants are pine and cedar.

Wetland plants are annual and perennial wild herbaceous plants that grow on moist or wet sites. Submerged or floating aquatic plants are excluded. Soil properties and features affecting wetland plants are texture of the surface layer, wetness, reaction, and slope. Examples of wetland plants are smartweed, wild millet, rushes, sedges, cutgrass, cattail, and reeds.

Shallow water areas have an average depth of less than 5 feet. Some are naturally wet areas. Others are created by dams, levees, or other water-control structures. Soil properties and features affecting shallow water areas are wetness, slope, and permeability. Examples of shallow water areas are marshes, waterfowl feeding areas, and ponds.

The habitat for various kinds of wildlife is described in the following paragraphs.

Habitat for openland wildlife consists of cropland, pasture, meadows, and areas that are overgrown with grasses, herbs, shrubs, and vines. These areas produce grain and seed crops, grasses and legumes, and wild herbaceous plants. The wildlife attracted to these areas include bobwhite quail, mourning doves, red fox, cottontail rabbit, and many species of song birds.

Habitat for woodland wildlife consists of areas of deciduous plants or coniferous plants or both and associated grasses, legumes, and wild herbaceous plants. Wildlife attracted to these areas include woodpeckers, squirrels, and gray fox.

Habitat for wetland wildlife consists of open, marshy or swampy shallow water areas. Some of the wildlife attracted to such areas are ducks, muskrat, raccoon, and red-wing blackbirds.

Engineering

John F. Rice, assistant state conservation engineer, Soil Conservation Service, helped prepare this section.

This section provides information for planning land uses related to urban development and to water management. Soils are rated for various uses, and the most limiting features are identified. The ratings are given in the following tables: Building site development, Sanitary facilities, Construction materials, and Water management. The ratings are based on observed performance of the soils and on the estimated data and test data in the "Soil Properties" section.

Information in this section is intended for land use planning, for evaluating land use alternatives, and for planning site investigations prior to design and construction. The information, however, has limitations. For example, estimates and other data generally apply only to that part of the soil within a depth of 5 or 6 feet. Because of the map scale, small areas of different soils may be included within the mapped areas of a specific soil.

The information is not site specific and does not eliminate the need for onsite investigation of the soils or for testing and analysis by personnel experienced in the design and construction of engineering works.

Government ordinances and regulations that restrict certain land uses or impose specific design criteria were not considered in preparing the information in this section. Local ordinances and regulations need to be considered in planning, in site selection, and in design.

Soil properties, site features, and observed performance were considered in determining the ratings in this section. During the fieldwork for this soil survey; determinations were made about grain-size distribution, liquid limit, plasticity index, soil reaction, soil wetness, depth to a seasonal high water table, slope, likelihood of flooding, natural soil structure aggregation, and soil density. Data were collected about kinds of clay minerals and mineralogy of the sand and silt fractions. Estimates were made for erodibility, permeability, corrosivity, shrink-swell potential, available water capacity, and other behavioral characteristics affecting engineering uses.

This information can be used to (1) evaluate the potential of areas for residential, commercial, industrial, and recreation uses; (2) make preliminary estimates of construction conditions; (3) evaluate alternative routes for roads, streets, highways, pipelines, and underground cables; (4) evaluate alternative sites for sanitary landfills, septic tank absorption fields, and sewage lagoons; (5) plan detailed onsite investigations of soils and geology; (6) locate potential sources of gravel, sand, earthfill, and topsoil; (7) plan drainage systems, irrigation systems, ponds, terraces, and other structures for soil and water conservation; and (8) predict performance of proposed small structures and pavements by comparing the

performance of existing similar structures on the same or similar soils.

The information in the tables, along with the soil maps, the soil descriptions, and other data provided in this survey can be used to make additional interpretations.

Some of the terms used in this soil survey have a special meaning in soil science and are defined in the Glossary.

Building Site Development

Table 10 shows the degree and kind of soil limitations that affect shallow excavations, dwellings with and without basements, small commercial buildings, local roads and streets, and lawns and landscaping. The limitations are considered *slight* if soil properties and site features are generally favorable for the indicated use and limitations are minor and easily overcome; *moderate* if soil properties or site features are not favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and *severe* if soil properties or site features are so unfavorable or so difficult to overcome that special design, significant increases in construction costs, and possibly increased maintenance are required. Special feasibility studies may be required where the soil limitations are severe.

Shallow excavations are trenches or holes dug to a maximum depth of 5 or 6 feet for basements, graves, utility lines, open ditches, and other purposes. The ratings are based on soil properties, site features, and observed performance of the soils. The ease of digging, filling, and compacting is affected by soil texture and slope. The time of the year that excavations can be made is affected by the depth to a seasonal high water table and the susceptibility of the soil to flooding. The resistance of the excavation walls or banks to sloughing or caving is affected by soil texture and the depth to the water table.

Dwellings and small commercial buildings are structures built on shallow foundations on undisturbed soil. The load limit is the same as that for single-family dwellings no higher than three stories. Ratings are made for small commercial buildings without basements, for dwellings with basements, and for dwellings without basements. The ratings are based on soil properties, site features, and observed performance of the soils. A high water table, flooding, shrink-swell potential, and organic layers can cause the movement of footings. A high water table and flooding affect the ease of excavation and construction. Landscaping and grading that require cuts and fills of more than 5 to 6 feet are not considered.

Local roads and streets have an all-weather surface and carry automobile and light truck traffic all year. They have a subgrade of cut or fill soil material, a base of gravel, crushed rock, or stabilized soil material, and a flexible or rigid surface. Cuts and fills are generally

limited to less than 6 feet. The ratings are based on soil properties, site features, and observed performance of the soils. A high water table, flooding, and slope affect the ease of excavating and grading. Soil strength (as inferred from the engineering classification of the soil), shrink-swell potential, and depth to a high water table affect the traffic supporting capacity.

Lawns and landscaping require soils on which turf and ornamental trees and shrubs can be established and maintained. The ratings are based on soil properties, site features, and observed performance of the soils. Soil reaction, a high water table, the available water capacity in the upper 40 inches, and the content of salts, sodium, and sulfidic materials affect plant growth. Flooding, wetness, slope, and the amount of sand, clay, or organic matter in the surface layer affect trafficability after vegetation is established.

Sanitary Facilities

Table 11 shows the degree and the kind of soil limitations that affect septic tank absorption fields, sewage lagoons, and sanitary landfills. The limitations are considered *slight* if soil properties and site features are generally favorable for the indicated use and limitations are minor and easily overcome; *moderate* if soil properties or site features are not favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and *severe* if soil properties or site features are so unfavorable or so difficult to overcome that special design, significant increases in construction costs, and possibly increased maintenance are required.

Table 11 also shows the suitability of the soils for use as daily cover for landfills. A rating of *good* indicates that soil properties and site features are favorable for the use and good performance and low maintenance can be expected; *fair* indicates that soil properties and site features are moderately favorable for the use and one or more soil properties or site features make the soil less desirable than the soils rated good; and *poor* indicates that one or more soil properties or site features are unfavorable for the use and overcoming the unfavorable properties requires special design, extra maintenance, or costly alteration.

Septic tank absorption fields are areas in which effluent from a septic tank is distributed into the soil through subsurface tiles or perforated pipe. Only that part of the soil between depths of 18 and 72 inches is evaluated. The ratings are based on soil properties, site features, and observed performance of the soils. Permeability, a high water table, and flooding affect absorption of the effluent.

Unsatisfactory performance of septic tank absorption fields, including excessively slow absorption of effluent, surfacing of effluent, and hillside seepage, can affect public health. Ground water can be polluted if highly permeable sand and gravel are less than 4 feet below

the base of the absorption field, if slope is excessive, or if the water table is near the surface. There must be unsaturated soil material beneath the absorption field to filter the effluent effectively. Many local ordinances require that this material be of a certain thickness.

Sewage lagoons are shallow ponds constructed to hold sewage while aerobic bacteria decompose the solid and liquid wastes. Lagoons should have a nearly level floor surrounded by cut slopes or embankments of compacted soil. Lagoons generally are designed to hold the sewage within a depth of 2 to 5 feet. Nearly impervious soil material for the lagoon floor and sides is required to minimize seepage and contamination of ground water.

Table 11 gives ratings for the natural soil that makes up the lagoon floor. The surface layer and, generally, 1 or 2 feet of soil material below the surface layer are excavated to provide material for the embankments. The ratings are based on soil properties, site features, and observed performance of the soils. Considered in the ratings are slope, permeability, a high water table, flooding, and content of organic matter.

Excessive seepage due to rapid permeability of the soil or a water table that is high enough to raise the level of sewage in the lagoon causes a lagoon to function unsatisfactorily. Pollution results if seepage is excessive or if floodwater overtops the lagoon. A high content of organic matter is detrimental to proper functioning of the lagoon because it inhibits aerobic activity. Steep slope can cause construction problems.

Sanitary landfills are areas where solid waste is disposed of by burying it in soil. There are two types of landfill—trench and area. In a trench landfill, the waste is placed in a trench. It is spread, compacted, and covered daily with a thin layer of soil excavated at the site. In an area landfill, the waste is placed in successive layers on the surface of the soil. The waste is spread, compacted, and covered daily with a thin layer of soil from a source away from the site.

Both types of landfill must be able to bear heavy vehicular traffic. Both types involve a risk of ground water pollution. Ease of excavation and revegetation needs to be considered.

The ratings in table 11 are based on soil properties, site features, and observed performance of the soils. Permeability, a high water table, slope, and flooding affect both types of landfill. Texture, highly organic layers, and soil reaction affect trench type landfills. Unless otherwise stated, the ratings apply only to that part of the soil within a depth of about 6 feet. For deeper trenches, a limitation rated slight or moderate may not be valid. Onsite investigation is needed.

Daily cover for landfill is the soil material that is used to cover compacted solid waste in an area type sanitary landfill. The soil material is obtained offsite, transported to the landfill, and spread over the waste.

Soil texture, wetness, and slope affect the ease of removing and spreading the material during wet and dry periods. Loamy or silty soils that are free of excess gravel are the best cover for a landfill. Clayey soils are sticky or cloddy and are difficult to spread; sandy soils are subject to soil blowing.

After soil material has been removed, the soil material remaining in the borrow area must be thick enough over the water table to permit revegetation. The soil material used as final cover for a landfill should be suitable for plants. The surface layer generally has the best workability, more organic matter, and the best potential for plants. Material from the surface layer should be stockpiled for use as the final cover.

Construction Materials

Table 12 gives information about the soils as a source of roadfill, sand, and topsoil. The soils are rated *good*, *fair*, or *poor* as a source of roadfill and topsoil. They are rated as a probable or improbable source of sand. The ratings are based on soil properties and site features that affect the removal of the soil and its use as construction material. Normal compaction, minor processing, and other standard construction practices are assumed. Each soil is evaluated to a depth of 5 or 6 feet.

Roadfill is soil material that is excavated in one place and used in road embankments in another place. In this table, the soils are rated as a source of roadfill for low embankments, generally less than 6 feet high and less exacting in design than higher embankments.

The ratings are for the soil material below the surface layer to a depth of 5 or 6 feet. It is assumed that soil layers will be mixed during excavating and spreading. Many soils have layers of contrasting suitability within their profile. The table showing engineering index properties provides detailed information about each soil layer. This information can help determine the suitability of each layer for use as roadfill. The performance of soil after it is stabilized with lime or cement is not considered in the ratings.

The ratings are based on soil properties, site features, and observed performance of the soils. The thickness of suitable material is a major consideration. The ease of excavation is affected by a high water table and slope. How well the soil performs in place after it has been compacted and drained is determined by its strength (as inferred from the engineering classification of the soil) and shrink-swell potential.

Soils rated *good* contain significant amounts of sand. They have at least 5 feet of suitable material, low shrink-swell potential, and slopes of 15 percent or less. Depth to the water table is more than 3 feet. Soils rated *fair* are more than 35 percent silt- and clay-sized particles and have a plasticity index of less than 10. They have moderate shrink-swell potential or slopes of 15 to 25 percent. Depth to the water table is 1 to 3 feet. Soils

rated *poor* have a plasticity index of more than 10 or a high shrink-swell potential. They are wet, and the depth to the water table is less than 1 foot. They may have layers of suitable material, but the material is less than 3 feet thick.

Sand is a natural aggregate suitable for commercial use with a minimum of processing. Sand is used in many kinds of construction. Specifications for each use vary widely. In table 12, only the probability of finding material in suitable quantity is evaluated. The suitability of the material for specific purposes is not evaluated, nor are factors that affect excavation of the material.

The properties used to evaluate the soil as a source of sand are gradation of grain sizes (as indicated by the engineering classification of the soil) and the thickness of suitable material. Acidity and stratification are given in the soil series descriptions. Gradation of grain sizes is given in the table on engineering index properties.

A soil rated as a probable source has a layer of clean sand that is up to 12 percent silty fines. This material must be at least 3 feet thick. All other soils are rated as an improbable source.

Topsoil is used to cover an area so that vegetation can be established and maintained. The upper 40 inches of a soil is evaluated for use as topsoil. Also evaluated is the reclamation potential of the borrow area.

Plant growth is affected by such properties as soil reaction, available water capacity, and fertility. The ease of excavating, loading, and spreading is affected by slope, a water table, soil texture, and thickness of suitable material. Reclamation of the borrow area is affected by slope and a water table.

Soils rated *good* have friable loamy material to a depth of at least 40 inches. They have little or no gravel and have slopes of less than 8 percent. They are naturally fertile or respond well to fertilizer and are not so wet that excavation is difficult.

Soils rated *fair* are sandy soils, loamy soils that have a relatively high content of clay, soils that have only 20 to 40 inches of suitable material, soils that have an appreciable amount of gravel, or soils that have slopes of 8 to 15 percent. The soils are not so wet that excavation is difficult.

Soils rated *poor* are very sandy or clayey, have less than 20 inches of suitable material, have a large amount of gravel, have slopes of more than 15 percent, or have a seasonal water table at or near the surface.

The surface layer of most soils is generally preferred for topsoil because of its organic matter content. Organic matter greatly increases the absorption and retention of moisture and nutrients for plant growth.

Water Management

Table 13 gives information on the soil properties and site features that affect water management. The degree and kind of soil limitations are given for pond reservoir

areas; embankments, dikes, and levees; and aquifer-fed ponds. The limitations are considered *slight* if soil properties and site features are generally favorable for the indicated use and limitations are minor and are easily overcome; *moderate* if soil properties or site features are not favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and *severe* if soil properties or site features are so unfavorable or so difficult to overcome that special design, significant increase in construction costs, and possibly increased maintenance are required.

This table also gives for each soil the restrictive features that affect drainage, terraces and diversions, and grassed waterways.

Pond reservoir areas hold water behind a dam or embankment. Soils best suited to this use have low seepage potential in the upper 60 inches. The seepage potential is determined by the permeability of the soil and the depth of permeable material. Excessive slope can affect the storage capacity of the reservoir area.

Embankments, dikes, and levees are raised structures of soil material, generally less than 20 feet high, constructed to impound water or to protect land against overflow. In this table, the soils are rated as a source of material for embankment fill. The ratings apply to the soil material below the surface layer to a depth of about 5 feet. It is assumed that soil layers will be uniformly mixed and compacted during construction.

The ratings do not indicate the ability of the natural soil to support an embankment. Soil properties to a depth even greater than the height of the embankment can affect performance and safety of the embankment. Generally, deeper onsite investigation is needed to determine these properties.

Soil material in embankments must be resistant to seepage, piping, and erosion and have favorable

compaction characteristics. Unfavorable features include less than 5 feet of suitable material and a high content of organic matter. A high water table affects the amount of usable material. It also affects trafficability.

Aquifer-fed excavated ponds are pits or dugouts that extend to a ground-water aquifer or to a depth below a permanent water table. Excluded are ponds that are fed only by surface runoff and embankment ponds that impound water 3 feet or more above the original surface. Excavated ponds are affected by depth to a permanent water table, permeability of the aquifer, quality of the water, and ease of excavation.

Drainage is the removal of excess surface and subsurface water from the soil. How easily and effectively the soil is drained depends on permeability, depth to a high water table or depth of standing water if the soil is subject to ponding, slope, susceptibility to flooding, and subsidence of organic layers. Excavating and grading and the stability of ditchbanks are affected by slope and the hazard of cutbanks caving. The productivity of the soil after drainage is adversely affected by extreme acidity. Availability of drainage outlets is not considered in the ratings.

Terraces and diversions are embankments or a combination of channels and ridges constructed across a slope to reduce erosion and conserve moisture by intercepting runoff. Slope and wetness affect the construction of terraces and diversions. A severe hazard of wind or water erosion, an excessively coarse texture, and restricted permeability adversely affect maintenance.

Grassed waterways are natural or constructed channels, generally broad and shallow, that conduct surface water to outlets at a nonerosive velocity. Wetness and slopes affect the construction of grassed waterways. A hazard of wind erosion, low available water capacity, and restricted permeability adversely affect the growth and maintenance of the grass after construction.

Soil Properties

Data relating to soil properties are collected during the course of the soil survey. The data and the estimates of soil and water features, listed in tables, are explained on the following pages.

Soil properties are determined by field examination of the soils and by laboratory index testing of some benchmark soils. Established standard procedures are followed (9). During the survey, many shallow borings are made and examined to identify and classify the soils and to delineate them on the soil maps. Samples are taken from some typical profiles and tested in the laboratory to determine grain-size distribution, plasticity, and compaction characteristics. These results are reported in table 17.

Estimates of soil properties are based on field examinations, on laboratory tests of samples from the survey area, and on laboratory tests of samples of similar soils in nearby areas. Tests verify field observations, verify properties that cannot be estimated accurately by field observation, and help characterize key soils.

The estimates of soil properties shown in the tables include the range of grain-size distribution and Atterberg limits, the engineering classifications, and the physical and chemical properties of the major layers of each soil. Pertinent soil and water features also are given.

Engineering Index Properties

Table 14 gives estimates of the engineering classification and of the range of index properties for the major layers of each soil in the survey area. Most soils have layers of contrasting properties within the upper 5 or 6 feet.

Depth to the upper and lower boundaries of each layer is indicated. The range in depth and information on other properties of each layer are given for each soil series under "Soil Series and Their Morphology."

Texture is given in the standard terms used by the U.S. Department of Agriculture. These terms are defined according to percentages of sand, silt, and clay in the fraction of the soil that is less than 2 millimeters in diameter. "Loam," for example, is soil that is 7 to 27 percent clay, 28 to 50 percent silt, and less than 52 percent sand. If the content of particles coarser than sand is as much as 15 percent, an appropriate modifier is added, for example, "gravelly." Textural terms are defined in the Glossary.

Classification of the soils is determined according to the Unified soil classification system (2) and the system adopted by the American Association of State Highway and Transportation Officials (1).

The Unified system classifies soils according to properties that affect their use as construction material. Soils are classified according to grain-size distribution of the fraction less than 3 inches in diameter and according to plasticity index, liquid limit, and organic matter content. Sandy and gravelly soils are identified as GW, GP, GM, GC, SW, SP, SM, and SC; silty and clayey soils as ML, CL, OL, MH, CH, and OH; and highly organic soils as PT. Soils exhibiting engineering properties of two groups can have a dual classification, for example, SP-SM.

The AASHTO system classifies soils according to those properties that affect roadway construction and maintenance. In this system, the fraction of a mineral soil that is less than 3 inches in diameter is classified in one of seven groups from A-1 through A-7 on the basis of grain-size distribution, liquid limit, and plasticity index. Soils in group A-1 are coarse grained and low in content of fines (silt and clay). At the other extreme, soils in group A-7 are fine grained. Highly organic soils are classified in group A-8 on the basis of visual inspection.

If laboratory data are available, the A-1, A-2, and A-7 groups are further classified as A-1-a, A-1-b, A-2-4, A-2-5, A-2-6, A-2-7, A-7-5, or A-7-6. As an additional refinement, the suitability of a soil as subgrade material can be indicated by a group index number. Group index numbers range from 0 for the best subgrade material to 20 or higher for the poorest. The AASHTO classification for soils tested is given in table 17.

Rock fragments larger than 3 inches in diameter are indicated as a percentage of the total soil on a dry-weight basis. The percentages are estimates determined mainly by converting volume percentage in the field to weight percentage.

Percentage (of soil particles) passing designated sieves is the percentage of the soil fraction less than 3 inches in diameter based on an oven-dry weight. The sieves, numbers 4, 10, 40, and 200 (USA Standard Series), have openings of 4.76, 2.00, 0.420, and 0.074 millimeters, respectively. Estimates are based on laboratory tests of soils sampled in the survey area and in nearby areas and on estimates made in the field.

Liquid limit and plasticity index (Atterberg limits) indicate the plasticity characteristics of a soil. The estimates are based on test data from the survey area or from nearby areas and on field examination.

The estimates of grain-size distribution, liquid limit, and plasticity index are rounded to the nearest 5 percent. Thus, if the ranges of gradation and Atterberg limits extend a marginal amount (1 or 2 percentage points) across classification boundaries, the classification in the marginal zone is omitted in the table.

Physical and Chemical Properties

Table 15 shows estimates of some characteristics and features that affect soil behavior. These estimates are given for the major layers of each soil in the survey area. The estimates are based on field observations and on test data for these and similar soils.

Permeability refers to the ability of a soil to transmit water or air. The estimates indicate the rate of downward movement of water when the soil is saturated. They are based on soil characteristics observed in the field, particularly structure, porosity, and texture. Permeability is considered in the design of soil drainage systems, septic tank absorption fields, and construction where the rate of water movement under saturated conditions affects behavior.

Available water capacity refers to the quantity of water that the soil is capable of storing for use by plants. The capacity for water storage is given in inches of water per inch of soil for each major soil layer. The capacity varies, depending on soil properties that affect the retention of water and the depth of the root zone. The most important properties are the content of organic matter, soil texture, bulk density, and soil structure. Available water capacity is an important factor in the choice of plants or crops to be grown and in the design and management of irrigation systems. Available water capacity is not an estimate of the quantity of water actually available to plants at any given time.

Soil reaction is a measure of acidity or alkalinity and is expressed as a range in pH values. The range in pH of each major horizon is based on many field tests. For many soils, values have been verified by laboratory analyses. Soil reaction is important in selecting crops and other plants, in evaluating soil amendments for fertility and stabilization, and in determining the risk of corrosion.

Shrink-swell potential is the potential for volume change in a soil with a loss or gain in moisture. Volume change occurs mainly because of the interaction of clay minerals with water and varies with the amount and type of clay minerals in the soil. The size of the load on the soil and the magnitude of the change in soil moisture content influence the amount of swelling of soils in place. Laboratory measurements of swelling of undisturbed clods were made for many soils. For others,

swelling was estimated on the basis of the kind and amount of clay minerals in the soil and on measurements of similar soils.

If the shrink-swell potential is rated moderate to very high, shrinking and swelling can cause damage to buildings, roads, and other structures. Special design is often needed.

Erosion factor K indicates the susceptibility of a soil to sheet and rill erosion by water. Factor K is one of six factors used in the Universal Soil Loss Equation (USLE) to predict the average annual rate of soil loss by sheet and rill erosion in tons per acre per year. The estimates are based primarily on percentage of silt, sand, and organic matter (up to 4 percent) and on soil structure and permeability. Values of K range from 0.05 to 0.69. The higher the value the more susceptible the soil is to sheet and rill erosion by water.

Erosion factor T is an estimate of the maximum average annual rate of soil erosion by wind or water that can occur without affecting crop productivity over a sustained period. The rate is in tons per acre per year.

Organic matter is the plant and animal residue in the soil at various stages of decomposition.

In table 15, the estimated content of organic matter is expressed as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter.

The content of organic matter of a soil can be maintained or increased by returning crop residue to the soil. Organic matter affects the available water capacity, infiltration rate, and tilth. It is a source of nitrogen and other nutrients for crops.

Soil and Water Features

Table 16 gives estimates of various soil and water features. The estimates are used in land use planning that involves engineering considerations.

Hydrologic soil groups are used to estimate runoff from precipitation. Soils not protected by vegetation are assigned to one of four groups. They are grouped according to the intake of water when the soils are thoroughly wet and receive precipitation from long-duration storms.

Some soils in table 16 are assigned to two hydrologic soil groups. The dual grouping is used because some soils have a seasonal high water table but can be drained. The first letter applies to the drained condition of the soil and the second letter to the undrained condition.

The four hydrologic soil groups are:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep

or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a permanent high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

Flooding, the temporary inundation of an area, is caused by overflowing streams or by runoff from adjacent slopes. Water standing for short periods after rainfall or snowmelt and water in swamps are not considered flooding.

Table 16 gives the frequency and duration of flooding and the time of year when flooding is most likely.

Frequency, duration, and probable dates of occurrence are estimated. Frequency is expressed as none, rare, common, occasional, and frequent. *None* means that flooding is not probable; *rare* that it is unlikely but possible under unusual weather conditions; *common* that it is likely under normal conditions; *occasional* that it occurs, on the average, no more than once in 2 years; and *frequent* that it occurs, on the average, more than once in 2 years. Duration is expressed as *very brief* if less than 2 days, *brief* if 2 to 7 days, and *long* if more than 7 days. Probable dates are expressed in months; November-May, for example, means that flooding can occur during the period November through May.

The information is based on evidence in the soil profile, namely thin strata of gravel, sand, silt, or clay deposited by floodwater; irregular decrease in organic matter content with increasing depth; and absence of distinctive horizons that form in soils that are not subject to flooding.

Also considered are local information about the extent and levels of flooding and the relation of each soil on the landscape to historic floods. Information on the extent of flooding based on soil data is less specific than that provided by detailed engineering surveys that delineate flood-prone areas at specific flood frequency levels.

High water table (seasonal) is the highest level of a saturated zone in the soil in most years. The depth to a seasonal high water table applies to undrained soils. The estimates are based mainly on the evidence of a saturated zone, namely grayish colors or mottles in the soil. Indicated in table 16 are the depth to the seasonal high water table; the kind of water table—that is,

perched, artesian, or apparent; and the months of the year that the water table commonly is high. A water table that is seasonally high for less than 1 month is not indicated in table 16.

An *apparent* water table is a thick zone of free water in the soil. It is indicated by the level at which water stands in an uncased borehole after adequate time is allowed for adjustment in the surrounding soil. A *perched* water table is water standing above an unsaturated zone. In places an upper, or perched, water table is separated from a lower one by a dry zone.

Only saturated zones within a depth of about 6 feet are indicated. A plus sign preceding the range in depth indicates that the water table is above the surface of the soil. The first numeral in the range indicates how high the water rises above the surface. The second numeral indicates the depth below the surface.

Risk of corrosion pertains to potential soil-induced electrochemical or chemical action that dissolves or weakens uncoated steel or concrete. The rate of corrosion of uncoated steel is related to such factors as soil moisture, particle-size distribution, total acidity, and electrical conductivity of the soil. The rate of corrosion of concrete is based mainly on the sulfate content, texture, moisture content, and acidity of the soil. Special site examination and design may be needed if the combination of factors creates a severe corrosion environment. The steel in installations that intersect soil boundaries or soil layers is more susceptible to corrosion than steel in installations that are entirely within one kind of soil or within one soil layer.

For uncoated steel, the risk of corrosion, expressed as *low*, *moderate*, or *high*, is based on soil drainage class, total acidity, electrical resistivity near field capacity, and electrical conductivity of the saturation extract.

For concrete, the risk of corrosion is also expressed as *low*, *moderate*, or *high*. It is based on soil texture, acidity, and amount of sulfates in the saturation extract.

Engineering Index Test Data

Table 17 shows laboratory test data for several pedons sampled at carefully selected sites in the survey area. The pedons are typical of the series and are described in the section "Soil Series and Their Morphology." The soil samples were tested by North Carolina Department of Transportation and Highway Safety, Materials and Tests Unit.

The testing methods generally are those of the American Association of State Highway and Transportation Officials (AASHTO) or the American Society for Testing and Materials (ASTM) (1,2).

The tests and methods are: AASHTO classification—M 145 (AASHTO), Mechanical analysis—T 88 (AASHTO), Plasticity index—T 90 (AASHTO), Moisture density, Method A—T 99 (AASHTO).

Formation of the Soils

Soil results from the combined effects of parent material, climate, plant and animal life, relief, and time. All of these factors affect the formation of every soil. In many places, one or two factors are dominant and fix most of the properties of the soil.

Parent Material

Many of the differences among the soils of Cumberland and Hoke Counties reflect differences in the geologic material from which the soils formed. For example, Nahunta and Aycock soils, which are high in silt content, formed in sediment which is high in silt content. In contrast, Lakeland and Candor soils, which are very sandy, formed in coarse sandy sediment. Johnston soils, on flood plains, and Wickham, Altavista, and Dogue soils, on terraces, formed in mixed alluvium consisting of sand, silt, and clay. Their profiles contain layers of contrasting texture.

Climate

Climate affects soil formation primarily by its influence on precipitation and temperature. Water is necessary for biological activity. It also dissolves minerals and moves them down through the soil profile. Temperature influences the kinds of organisms in the soil and their growth. It also largely determines the speed and extent of chemical and physical reactions in the soil.

Cumberland and Hoke Counties have a warm, humid climate that results in conditions which cause rapid decomposition of organic matter and which are favorable to chemical reactions in the soil. The abundant rainfall leaches out soluble bases and carries finer mineral particles downward. As a result, all of the mineral soils in this survey area are acid, highly weathered, and highly leached. Variations in climate within the survey area are slight. They probably do not cause significant local differences in formation of soils.

Plant and Animal Life

Bacteria, fungi, and other relatively simple organisms aid in weathering soil and in decomposing organic matter. Larger plants and animals produce organic matter and translocate elements and material within the soil.

The activities of fungi and micro-organisms take place only in the upper few inches of the soil in this area. Earthworms and other small invertebrates carry on a slow, but continuous cycle of mixing within this thin surface layer. Rodents have had little effect on the formation of soils in this survey area.

Pine forests originally covered most of the Coastal Plain and Sandhill uplands in the survey area. Baldcypress, water tupelo, and other hardwoods were dominant on flood plains and along drainageways. These trees took up elements from the subsoil. When twigs, trunks, branches, and leaves decayed, elements were deposited back into the soil. This same process added organic matter to the surface layer.

How long organic matter remains in the soil is greatly dependent upon soil drainage. In such well drained soils as those of the Norfolk and Wagram series, any organic matter is rapidly broken down by micro-organisms. As a result, very little organic matter accumulates in the surface layer of such soils. Organic matter breakdown is slower in wetter soils, such as those of the Pantego and Byars series. Therefore, these wet soils have a dark colored surface layer that is relatively higher in organic matter content. Soils in some large Carolina bays are wet almost continuously. Under these conditions organic matter accumulates year after year. Little or no mineralization occurs. This results in the formation of soils, such as Croatan soils, which have a black organic surface layer more than 4 feet thick, in places.

Relief

Relief influences runoff, erosion, drainage, aeration, and exposure to sun and wind. Soils in the survey area range from nearly level to moderately steep. Where geologic erosion removes soil material as it forms, the more sloping soils, such as Gilead, Vaucluse, and Blaney soils, are shallower than Aycock, Norfolk, Wagram, and other nearly level to gently sloping soils. These shallower soils have brittle layers. Relief largely governs natural drainage. As a result, it strongly influences the accumulation of organic matter in soils.

Time

Some differences in soils reflect differences in age. It takes a long time for a sequence of horizons in a natural

soil to develop. Horizons are more strongly defined in older soils than in younger soils, assuming both formed under the same conditions and in similar parent material.

The older soils in the survey area formed on the smooth, nearly level upland divides. These soils have well developed horizons. Norfolk, Wagram, and

Goldsboro soils are examples. These soils formed in Coastal Plain sediment on landscapes that have remained essentially unchanged for millions of years. In contrast, the younger Johnston and Chewacla soils formed in alluvial material that has not been in place long enough for well defined horizons to develop.

Classification of the Soils

The system of soil classification used by the National Cooperative Soil Survey has six categories (12). Beginning with the broadest, these categories are the order, suborder, great group, subgroup, family, and series. Classification is based on soil properties observed in the field or inferred from those observations or from laboratory measurements. Table 18 shows the classification of the soils in the survey area. The categories are defined in the following paragraphs.

ORDER. Ten soil orders are recognized. The differences among orders reflect the dominant soil-forming processes and the degree of soil formation. Each order is identified by a word ending in *sol*. An example is Ultisol.

SUBORDER. Each order is divided into suborders primarily on the basis of properties that influence soil genesis and are important to plant growth or properties that reflect the most important variables within the orders. The last syllable in the name of a suborder indicates the order. An example is Udult (*Udu*, meaning of humid climates, plus *ult*, from Ultisol).

GREAT GROUP. Each suborder is divided into great groups on the basis of close similarities in kind, arrangement, and degree of development of pedogenic horizons; soil moisture and temperature regimes; and base status. Each great group is identified by the name of a suborder and by a prefix that indicates a property of the soil. An example is Hapludults (*Hapl*, meaning minimal horizonation, plus *ult*, the suborder of the Ultisols that occurs in humid climates).

SUBGROUP. Each great group has a typic subgroup. Other subgroups are intergrades or extragrades. The typic is the central concept of the great group; it is not necessarily the most extensive. Intergrades are transitions to other orders, suborders, or great groups. Extragrades have some properties that are not representative of the great group but do not indicate transitions to any other known kind of soil. Each subgroup is identified by one or more adjectives preceding the name of the great group. The adjective *Typic* identifies the subgroup that typifies the great group. An example is Typic Hapludults.

FAMILY. Families are established within a subgroup on the basis of physical and chemical properties and other characteristics that affect management. Mostly the properties are those of horizons below plow depth where there is much biological activity. Among the properties and characteristics considered are particle-size class, mineral content, temperature regime, depth of the root zone, consistence, moisture equivalent, slope, and permanent cracks. A family name consists of the name of a subgroup preceded by terms that indicate soil properties. An example is fine-loamy, mixed, thermic Typic Hapludults.

SERIES. The series consists of soils that have similar horizons in their profile. The horizons are similar in color, texture, structure, reaction, consistence, mineral and chemical composition, and arrangement in the profile. The texture of the surface layer or of the substratum can differ within a series.

Soil Series and Their Morphology

In this section, each soil series recognized in the survey area is described. The descriptions are arranged in alphabetic order.

Characteristics of the soil and the material in which it formed are identified for each series. A pedon, a small three-dimensional area of soil that is typical of the series in the survey area, is described. The detailed description of each soil horizon follows standards in the Soil Survey Manual (8). Many of the technical terms used in the descriptions are defined in Soil Taxonomy (12). Unless otherwise stated, colors in the descriptions are for moist soil. Following the pedon description is the range of important characteristics of the soils in the series.

The map units of each soil series are described in the section "Detailed Soil Map Units."

Altavista Series

The Altavista series consists of moderately well drained soils that formed in fluvial sediment on terraces along the Cape Fear and Lower Little Rivers in Cumberland County. Slope ranges from 0 to 3 percent.

Typical pedon of Altavista fine sandy loam, 0 to 3 percent slopes, in Cumberland County, is 2.25 miles east of Fayetteville, 400 feet northeast of the intersection of State Road 2000 and State Road 2005 along State Road 2000, and 50 feet south of road:

- Ap—0 to 7 inches; grayish brown (10YR 5/2) fine sandy loam; weak fine granular structure; very friable; common fine roots; slightly acid; abrupt smooth boundary.
- E—7 to 11 inches; light yellowish brown (10YR 6/4) fine sandy loam; weak fine granular structure; friable; common fine roots; strongly acid; clear smooth boundary.
- Bt1—11 to 25 inches; yellowish brown (10YR 5/8) sandy clay loam; common medium distinct strong brown (7.5YR 5/6) and common fine distinct red (2.5YR 4/6) mottles; moderate medium subangular blocky structure; friable; few thin clay films on faces of pedis and in pores; few flakes of mica; strongly acid; gradual wavy boundary.
- Bt2—25 to 37 inches; yellowish brown (10YR 5/8) sandy clay loam; common medium distinct yellowish red (5YR 4/6), few medium distinct gray (10YR 5/1), and common medium distinct light brownish gray (10YR

6/2) mottles; weak medium subangular blocky structure; friable; few thin clay films on faces of pedis and in pores; few flakes of mica; strongly acid; gradual wavy boundary.

BC—37 to 54 inches; mottled yellowish brown (10YR 5/8), red (2.5YR 4/6), and gray (10YR 6/1) sandy loam; weak fine and medium subangular blocky structure; friable; few flakes of mica; strongly acid; gradual wavy boundary.

C—54 to 80 inches; brownish yellow (10YR 6/6) sand; common medium distinct light gray (10YR 7/2) mottles; single grained; loose; very strongly acid.

Altavista soils have loamy horizons, 30 to 60 inches thick, over stratified sandy material. Reaction ranges from very strongly acid through medium acid in all horizons, except where the surface has been limed.

The A or Ap horizon has hue of 10YR or 7.5YR, value of 4 or 5, and chroma of 2 through 4; or it has hue of 2.5Y, value of 4 or 5, and chroma of 2. The E horizon, where present, has hue of 10YR or 2.5Y, value of 6 or 7, and chroma of 3 or 4.

The Bt horizon has hue of 10YR or 7.5YR, value of 5 or 6, and chroma of 4 through 8. The lower part of the Bt horizon is gray in some pedons. The Bt horizon commonly is sandy clay loam, but it ranges to clay loam. The BC horizon is similar in color to the Bt horizon. It is sandy loam or loamy sand.

The C horizon commonly is stratified sand, loamy sand, or sandy loam. Coarse sand or gravel is present in some pedons.

Autryville Series

The Autryville series consists of well drained soils that formed in loamy sediment on uplands. Slope ranges from 0 to 2 percent.

Typical pedon of Autryville loamy sand, 0 to 2 percent slopes, in Cumberland County, is about 16 miles southeast of Fayetteville, 0.2 mile east of the intersection of State Road 2031 and N.C. Highway 210 along State Road 2031, and 50 feet north of the road in a field:

- Ap—0 to 9 inches; dark grayish brown (10YR 4/2) loamy sand; weak fine granular structure; very friable; common fine and medium roots; slightly acid; abrupt smooth boundary.
- E—9 to 25 inches; light yellowish brown (10YR 6/4) sand; weak medium granular structure; very friable;

few fine roots; few fine pockets of uncoated sand; medium acid; clear smooth boundary.

Bt—25 to 39 inches; yellowish brown (10YR 5/8) sandy loam; weak fine subangular blocky structure; very friable; strongly acid; gradual wavy boundary.

E'—39 to 59 inches; brownish yellow (10YR 6/8) sand; single grained; loose; common medium pockets of clean sand grains; strongly acid; gradual wavy boundary.

B't—59 to 80 inches; brownish yellow (10YR 6/8) sandy loam; common medium distinct very pale brown (10YR 7/3) mottles; weak fine subangular blocky structure; very friable; strongly acid.

The sandy and loamy horizons are more than 60 inches deep to stratified deposits of the Coastal Plain. Reaction is very strongly acid or strongly acid throughout the soil, except where the surface has been limed.

The Ap or A horizon has hue of 10YR or 2.5Y, value of 4 or 5, and chroma of 2. The E horizon has hue of 10YR, value of 4 through 7, and chroma of 3 or 4; or it has hue of 2.5Y, value of 6 or 7, and chroma of 4.

The Bt horizon has hue of 10YR, value of 5 or 6, and chroma of 6 through 8; or it has hue of 7.5YR, value of 5, and chroma of 6 through 8. It is sandy clay loam or sandy loam.

The E' horizon has hue of 10YR, value of 5 or 6, and chroma of 6 through 8; or it has value of 7 and chroma of 3 or 4. It is sand or loamy sand.

The B't horizon has hue of 7.5YR to 2.5Y, value of 4 to 6, and chroma of 3 to 8; or it is mottled in shades of brown, yellow, red, or gray. It is sandy clay loam or sandy loam.

Aycock Series

The Aycock series consists of well drained soils that formed in loamy and silty sediment on uplands. Slope ranges from 1 to 4 percent.

Typical pedon of Aycock loam, 1 to 4 percent slopes, in Cumberland County, is approximately 11 miles northeast of Fayetteville, 0.2 mile south of the intersection of I-95 and State Road 1005 along I95, 50 feet east of the road:

Ap—0 to 9 inches; dark grayish brown (10YR 4/2) loam; weak fine granular structure; very friable; common fine roots; neutral; clear smooth boundary.

E—9 to 13 inches; light yellowish brown (2.5Y 6/4) loam; weak medium granular structure; very friable; few fine roots; neutral; gradual wavy boundary.

Bt1—13 to 26 inches; yellowish brown (10YR 5/8) clay loam; weak medium subangular blocky structure; friable, slightly sticky, slightly plastic; few fine roots; few fine pores; few discontinuous clay films on faces of peds; strongly acid; gradual wavy boundary.

Bt2—26 to 34 inches; yellowish brown (10YR 5/8) clay loam; few fine distinct yellowish red mottles; weak

medium subangular blocky structure; friable, slightly sticky, slightly plastic; few fine pores; few discontinuous clay films on faces of peds; strongly acid; gradual wavy boundary.

Bt3—34 to 53 inches; yellowish brown (10YR 5/8) clay loam; few medium distinct yellowish red (5YR 4/6) and few medium faint pale brown (10YR 6/3) mottles; weak medium subangular blocky structure; friable, slightly sticky; few discontinuous clay films on faces of peds; strongly acid; gradual wavy boundary.

Bt4—53 to 65 inches; yellowish brown (10YR 5/8) clay loam; common medium distinct red (2.5YR 4/6), light gray (10YR 6/1), and strong brown (7.5YR 5/6) mottles; weak fine and medium subangular blocky structure; friable, slightly sticky; very strongly acid; gradual wavy boundary.

C—65 to 80 inches; mottled strong brown (7.5YR 5/6), light gray (10YR 7/1), and red (2.5YR 4/6) clay; massive; firm, sticky, plastic; very strongly acid.

The loamy and silty horizons are more than 60 inches deep to stratified sediment of the Coastal Plain. Reaction is very strongly acid or strongly acid throughout the soil, except where the surface has been limed.

The A horizon has hue of 10YR, value of 4 or 5, and chroma of 2 or 3; hue of 2.5Y, value of 6, and chroma of 4; or hue of 2.5Y, value of 4 or 5, and chroma of 2.

The Bt horizon has hue of 10YR and 2.5Y, value of 5 or 6, and chroma of 4 through 8. Brown, red, and gray mottles are common below a depth of about 30 inches. The Bt horizon is silty clay loam, clay loam, or loam. The BC horizon, where present, is similar in color and texture to the Bt horizon.

The C horizon is mottled strong brown, light gray, or red clay. One to 5 percent plinthite is present in the C horizon of some pedons.

Blaney Series

The Blaney series consists of well drained soils that formed in sandy and loamy sediment on uplands. Slope ranges from 2 to 15 percent.

Typical pedon of Blaney loamy sand, 2 to 8 percent slopes, in Hoke County, is approximately 15 miles northwest of Raeford on the Fort Bragg Military Reservation:

A—0 to 4 inches; dark grayish brown (10YR 4/2) loamy sand; weak fine granular structure; friable; many fine and medium roots; very strongly acid; abrupt smooth boundary.

E—4 to 25 inches; light yellowish brown (2.5Y 6/4) loamy sand; single grained; loose; strongly acid; abrupt smooth boundary.

Bt1—25 to 34 inches; brownish yellow (10YR 6/6) sandy clay loam; weak medium subangular blocky

structure; firm, brittle in place; very strongly acid; gradual wavy boundary.

Bt2—34 to 62 inches; reddish yellow (7.5YR 6/6) sandy clay loam; weak coarse subangular blocky structure; firm, brittle in place; very strongly acid; clear wavy boundary.

C—62 to 80 inches; yellow (10YR 7/6) loamy coarse sand; single grained; loose; very strongly acid.

The sandy and loamy horizons are more than 60 inches deep to stratified deposits of the Coastal Plain. Reaction is very strongly acid or strongly acid throughout the soil, except where the surface has been limed. The Bt horizon, immediately below the E horizon, is hard and compact when dry, but it is friable when moist.

The Ap horizon has hue of 10YR or 2.5Y, value of 4 or 5, and chroma of 2. The A horizon, where present, has hue of 10YR, value of 3 or 4, and chroma of 1 or 2. The E horizon has hue of 10YR, value of 6, and chroma of 2 through 4; or it has hue of 2.5Y, value of 6, and chroma of 4.

The Bt horizon has hue of 7.5YR, value of 6, and chroma of 4 through 8; or it has hue of 10YR, value of 5 or 6, and chroma of 6 through 8. In places hue is 10YR, value is 7, and chroma is 3 or 4. The Bt horizon is sandy clay loam or sandy loam. Some pedons have horizons of sandy clay that are less than 10 inches thick in the lower part. The Bt horizon is hard and brittle when the soil is dry.

The C horizon of loamy coarse sand is below a depth of 60 inches in some pedons.

Bragg Series

The Bragg series consists of well drained soils that formed from material of cutting and filling operations in the uplands of the Coastal Plain. Slope ranges from 1 to 4 percent.

Typical pedon of Bragg sandy loam, 1 to 4 percent slopes, in Cumberland County, is on the Fort Bragg Military Reservation, 2 miles northwest from the intersection of Macridge Road and Plank Road, 500 feet west of Macridge Road:

Ap—0 to 6 inches; strong brown (7.5YR 5/8) sandy loam; massive; friable; strongly acid; clear wavy boundary.

C1—6 to 20 inches; strong brown (7.5YR 5/8), grayish brown (10YR 5/2), and gray (10YR 6/1) sandy clay loam; massive; firm, slightly sticky; strongly acid; clear wavy boundary.

C2—20 to 30 inches; reddish yellow (7.5YR 6/8) sandy clay loam; common medium light gray (N 7/0) clay bodies and strata; massive; firm, slightly sticky; strongly acid; clear smooth boundary.

C3—30 to 40 inches; light yellowish brown (10YR 6/4) sandy clay; common medium distinct red (2.5YR

5/8) mottles; massive; firm, slightly sticky; strongly acid; clear wavy boundary.

C4—40 to 49 inches; reddish yellow (7.5YR 6/8) sandy clay loam that has common medium distinct light gray (N 7/0) clay bodies; massive; friable, slightly sticky; strongly acid; clear wavy boundary.

C5—49 to 56 inches; yellowish red (5YR 5/6) sandy clay loam; common medium distinct brownish yellow (10YR 6/8) mottles; massive; firm, slightly sticky; strongly acid; clear wavy boundary.

C6—56 to 72 inches; light red (2.5YR 6/8) sandy clay; common medium distinct reddish yellow (7.5YR 6/8) mottles; massive; firm, slightly sticky; common fine bodies of clay; strongly acid; abrupt smooth boundary.

Ab—72 to 76 inches; very dark gray (N 3/0) loamy sand; weak fine granular structure; very friable; strongly acid; clear smooth boundary.

Eb—76 to 80 inches; brown (10YR 4/3) loamy sand; weak fine granular structure; very friable; strongly acid.

The fill material ranges from 20 inches to more than 80 inches in thickness. Reaction is very strongly acid or strongly acid, except where the surface has been limed. All horizons are 0 to 3 percent, by volume, coarse fragments of quartz and ironstone.

The Ap horizon has hue of 5YR to 10YR, value of 4 to 6, and chroma of 1 to 8.

The C horizon has hue of 2.5YR to 7.5YR, value of 3 to 6, and chroma of 4 to 8; or it has hue of 10YR, value of 4 to 7, and chroma of 2 to 8. Soil colors are generally contrasting from layer to layer. Low chroma is not indicative of wetness but is a condition of the original soil. The C horizon is sandy loam, sandy clay loam, clay loam, or sandy clay. Subhorizons of loamy sand or clay are in many pedons. The 10- to 40-inch control section averages from 18 to 35 percent clay. Underlying horizons are quite variable in colors and texture.

Butters Series

The Butters series consists of well drained soils that formed in sandy and loamy sediment on uplands. Slope ranges from 0 to 2 percent.

Typical pedon of Butters loamy sand, 0 to 2 percent slopes, in Cumberland County, is 2.5 miles southeast of Vander, 0.25 mile southeast of the intersection of State Road 1842 and N.C. Highway 24 along N.C. Highway 24, and 100 feet north of paved road, in a cultivated field:

Ap—0 to 9 inches; very dark grayish brown (10YR 3/2) loamy sand; weak fine granular structure; friable; few fine roots; slightly acid; clear wavy boundary.

Bt1—9 to 15 inches; yellowish brown (10YR 5/6) sandy loam; weak fine granular structure; friable; few fine roots; strongly acid; gradual wavy boundary.

Bt2—15 to 37 inches; yellowish brown (10YR 5/4) sandy loam that has common sandy clay loam bodies; weak fine subangular blocky structure; friable; many fine pores; strongly acid; gradual wavy boundary.

BE1—37 to 45 inches; brownish yellow (10YR 6/6) loamy sand; weak fine granular structure; very friable; strongly acid; gradual wavy boundary.

BE2—45 to 58 inches; brownish yellow (10YR 6/6) sand; single grained; loose; many uncoated sand grains; strongly acid; gradual wavy boundary.

B't—58 to 80 inches; brownish yellow (10YR 6/6) sandy loam; common medium distinct gray (10YR 6/1) mottles; weak fine granular structure; friable; strongly acid.

The loamy and sandy horizons are more than 60 inches deep to stratified deposits of the Coastal Plain. Reaction is strongly acid, except where the surface has been limed.

The A horizon has hue of 10YR, value of 3 through 5, and chroma of 1 through 3.

The Bt1 horizon has hue of 10YR or 2.5Y, value of 5 through 7, and chroma of 6 through 8. It is sandy loam or fine sandy loam. The Bt2 horizon has hue of 7.5YR or 10YR, value of 5 through 7, and chroma of 4 through 8. Mottles, where present, are in shades of brown, yellow, and red. The Bt2 horizon is sandy loam or fine sandy loam and may range to sandy clay loam. The BC horizon, where present, is similar in color to the B2t horizon. It is sandy loam, fine sandy loam, loamy sand, or loamy fine sand.

The BE horizon has hue of 10YR or 2.5Y, value of 6 through 8, and chroma of 2 through 8. Mottles, where present, are in shades of gray, brown, yellow, or red. It is sand, fine sand, loamy sand, or loamy fine sand.

The B't horizon has hue of 10YR or 2.5Y, value of 5 through 8, and chroma of 1 through 8. Mottles are in shades of brown, yellow, red, or gray. The B't horizon is sandy loam or sandy clay loam.

Byars Series

The Byars series consists of very poorly drained soils that formed in clayey sediment on uplands. Slope is less than 2 percent.

Typical pedon of Byars loam, in Cumberland County, is 1.5 miles west of Stedman, 0.5 mile west of the intersection of N.C. Highway 24 and State Road 2020 along State Road 2020, 0.25 mile southwest along a field road, and 50 feet west of the road, in a pasture:

Ap—0 to 9 inches; black (10YR 2/1) loam; weak medium granular structure; friable; common fine and medium roots; strongly acid; clear smooth boundary.

A—9 to 18 inches; very dark gray (10YR 3/1) loam; weak medium granular structure; friable; common fine and medium roots; strongly acid; gradual smooth boundary.

BA—18 to 24 inches; very dark gray (10YR 3/1) clay loam; weak medium subangular blocky structure; friable; slightly sticky, slightly plastic; few fine roots; very strongly acid; gradual wavy boundary.

Btg1—24 to 42 inches; gray (10YR 5/1) clay; few medium distinct yellowish brown (10YR 5/6) mottles; weak medium subangular blocky structure; firm, sticky, plastic; old root channels filled with A1 material; few fine roots; strongly acid; gradual wavy boundary.

Btg2—42 to 80 inches; gray (10YR 5/1) clay; few pockets of light gray (10YR 6/1) sand; few fine distinct yellowish brown (10YR 5/6) mottles; weak coarse subangular blocky structure; firm, sticky, plastic; very strongly acid.

The loamy and clayey horizons are 60 inches to more than 80 inches deep to stratified sediment of the Coastal Plain. Reaction is very strongly acid or strongly acid, except where the surface has been limed.

The A horizon has hue of 10YR or is neutral, value of 2 or 3, and chroma of 0 to 1.

The BA horizon, where present, has hue of 10YR, value of 2 or 3, and chroma of 0 to 1. It is loam, clay loam, silty clay loam, or silt loam. The Btg horizon has hue of 10YR, value of 3 through 7, and chroma of 1 or 2. It is clay, clay loam, or silty clay loam. Some pedons have few to common yellowish brown and yellowish red mottles throughout the subsoil.

Candor Series

The Candor series consists of somewhat excessively drained soils that formed in sandy and loamy sediment on uplands. Slope ranges from 1 to 15 percent.

Typical pedon of Candor sand, 1 to 8 percent slopes, in Hoke County, about 2 miles east of Raeford, 0.6 mile northeast of the intersection of U. S. Highway 401 and State Road 1406, and 0.35 mile northwest of the road:

Ap—0 to 9 inches; dark grayish brown (10YR 4/2) sand; weak fine granular structure; very friable; few fine roots; strongly acid; abrupt smooth boundary.

E—9 to 20 inches; yellowish brown (10YR 5/4) sand; weak fine granular structure; very friable; few fine roots; strongly acid; abrupt wavy boundary.

Bt—20 to 30 inches; yellowish brown (10YR 5/6) loamy sand; weak fine subangular blocky structure parting to weak fine granular; very friable; strongly acid; gradual wavy boundary.

E'1—30 to 33 inches; brownish yellow (10YR 6/6) sand; single grained; loose; strongly acid; gradual smooth boundary.

E'2—33 to 60 inches; brownish yellow (10YR 6/6) sand; single grained; loose; common fine pockets of clean sand; strongly acid; gradual diffuse boundary.

B't—60 to 80 inches; strong brown (7.5YR 5/6) sandy clay loam; many medium and coarse distinct light gray (10YR 7/1) and yellowish red (5YR 5/8) mottles; moderate medium subangular blocky structure; friable; very strongly acid.

The sandy horizons, or depth to the B't horizon, ranges from 40 to 80 inches. The soil ranges from extremely acid to strongly acid, except where it has been limed. Coarse fragments of ironstone make up 0 to 5 percent of the A and Bt horizons and from 0 to 15 percent of the E' and B't horizons.

The Ap or A horizon has hue of 10YR, value of 4 or 5, and chroma of 2 or 3.

The E horizon has hue of 10YR, value of 5 to 7, and chroma of 3 to 6. It is sand.

The Bt horizon has hue of 7.5YR or 10YR, value of 5 or 6, and chroma of 4 to 8. It is loamy sand.

The E' horizon has hue of 10YR, value of 5 to 8, and chroma of 3 to 8. It is sand.

The B't horizon has hue of 7.5YR to 10YR, value of 5 or 6, and chroma of 4 to 8, or it is mottled in shades of yellow, brown, red, or gray. The B't horizon ranges from sandy loam to sandy clay loam or sandy clay. On smooth to gently undulating interstream divides, some pedons contain plinthite between depths of 60 and 80 inches.

The BC horizon, where present, and the C horizon have hue of 7.5YR or 10YR, value of 6 to 8, and chroma of 4 to 8. Mottles in shades of yellow, brown, red, gray, and white are common in the BC horizon. Fine to medium bodies of white kaolin and flakes of mica are few to common. The BC and C horizons range from sandy loam to clay that is dense, compact, and stratified.

Cape Fear Series

The Cape Fear series consists of very poorly drained soils that formed in alluvial and fluvial sediment on terraces along the Cape Fear and Lower Little Rivers. These soils are in Cumberland County. Slope is less than 2 percent.

Typical pedon of Cape Fear loam, in Cumberland County, is 3 miles east of Fayetteville on State Road 1834, 1.6 miles east of the intersection of State Road 1834 and N.C. Highway 24, 150 feet north of State Road 1834, in a cultivated field:

Ap—0 to 7 inches; black (10YR 2/1) loam; weak fine granular structure; friable; common fine roots; common fine and medium pores; few clean sand grains; slightly acid; clear smooth boundary.

A—7 to 16 inches; black (10YR 2/1) loam; weak medium granular structure; friable; common fine roots; common fine and medium pores; few clean sand grains; medium acid; clear wavy boundary.

BA—16 to 20 inches; dark gray (10YR 4/1) clay loam; weak fine subangular blocky structure; firm, sticky, plastic; few fine roots; common fine and medium

pores; common amounts of A1 material in old root holes; few fine flakes of mica and white mineral grains; strongly acid; clear wavy boundary.

Btg1—20 to 38 inches; gray (10YR 5/1) clay; weak medium subangular blocky structure; firm, sticky, plastic; few fine pores; common amounts of A1 material and very dark grayish brown (10YR 3/2) material in root holes; common fine flakes of mica and white mineral grains; strongly acid; gradual wavy boundary.

Btg2—38 to 45 inches; gray (10YR 6/1) clay; weak medium subangular blocky structure; firm, sticky, plastic; common flakes of mica, and red and white mineral grains; this horizon contains more sand than the horizon above; strongly acid; gradual wavy boundary.

BCg—45 to 52 inches; light brownish gray (2.5Y 6/2) sandy clay loam; weak medium subangular blocky structure; friable; few flakes of mica and red and white mineral grains; common pockets of loamy sand; strongly acid; gradual smooth boundary.

Cg—52 to 62 inches; light brownish gray (10YR 6/2) sand; single grained; loose; few flakes of mica and common red and white mineral grains; strongly acid.

The loamy and clayey horizons range from 40 to 60 inches in thickness. Reaction ranges from very strongly acid through medium acid in all horizons, except where the surface has been limed. Flakes of mica, feldspar, and other weatherable minerals are common in most pedons.

The A horizon has hue of 10YR or 2.5Y, value of 2 or 3, and chroma of 1 or 2 or N, and value of 2 or 3.

The BA horizon has hue of 10YR or 2.5Y, value of 3 or 4, and chroma of 1 or 2, or N, and value of 3 or 4. It is clay loam, silty clay loam, sandy clay loam, or loam. The Btg horizon has hue of 10YR or 2.5YR, value of 4 to 7, and chroma of 2 or N and value of 4 or 5. Some pedons contain few to common mottles of higher chroma. The Btg horizon is clay, sandy clay, clay loam, or silty clay. The upper 20 inches is 35 to 55 percent clay. The BCg horizon has hue of 10YR or 2.5Y, value of 4 to 7, and chroma of 1 or 2. It is sandy clay loam, clay loam, sandy clay, or sandy loam.

The Cg horizon is similar in color to the BCg horizon and is sand or loamy sand. It is 0 to 10 percent gravel.

Chewacla Series

The Chewacla series consists of somewhat poorly drained soils that formed in recent alluvium on flood plains along the Cape Fear and Lower Little Rivers. These soils are in Cumberland County. Slope is less than 2 percent.

Typical pedon of Chewacla loam, in Cumberland County, is 3.5 miles southwest of Cedar Creek on State

Road 2229, 0.6 mile west on farm road, and 200 feet west, in a pasture:

- Ap—0 to 8 inches; brown (7.5YR 4/4) loam; moderate medium granular structure; friable; many fine roots; many fine pores; slightly acid; clear smooth boundary.
- A—8 to 18 inches; dark brown (10YR 3/3) loam; about 40 percent of the horizon is brown (10YR 5/3); massive parting to weak medium subangular blocky structure; friable; common fine roots; common fine pores; few fine charcoal fragments; few fine flakes of mica; medium acid; clear smooth boundary.
- Bw1—18 to 25 inches; dark yellowish brown (10YR 4/4) loam; common medium distinct light brownish gray (10YR 6/2) mottles; weak medium subangular structure; friable; few fine flakes of mica; strongly acid; gradual wavy boundary.
- Bw2—25 to 48 inches; reddish brown (5YR 4/4) clay loam; common medium distinct light brownish gray (10YR 6/2) mottles; weak medium subangular blocky structure; friable; common fine flakes of mica; common fine manganese concretions; very strongly acid; gradual wavy boundary.
- BC—48 to 64 inches; mottled brown (7.5YR 5/4) and light brownish gray (10YR 6/2) sandy clay loam; lenses of sandy loam; massive; friable; many fine flakes of mica; very strongly acid.

The loamy horizon is 36 inches to more than 72 inches deep to stratified sediment. Reaction ranges from very strongly acid to slightly acid throughout.

The A horizon has hue of 10YR, value of 3 through 5, and chroma of 3; or it has hue of 7.5YR, value of 4 or 5, and chroma of 4.

The Bw1 and Bw2 horizons have hue of 10YR, value of 6, and chroma of 4 or value of 4 or 5 and chroma of 3 or 4; hue of 7.5YR, value of 4 or 5, and chroma of 2 through 4; or hue of 5YR, value of 4 or 5, and chroma of 3 or 4. The Bw2 horizon typically has more gray mottles than the Bw1 horizon. The BC horizon has hue of 10YR, value of 5, and chroma of 4; hue of 2.5Y, value of 5, and chroma of 4 through 6; or hue of 10YR or 2.5Y, value of 5 or 6, and chroma of 2. Gray mottles indicative of wetness are within 24 inches of the surface. The Bw horizon is sandy clay loam, sandy loam, loam, silt loam, or clay loam. Dark concretions are common in some pedons.

The C horizon is stratified loam, sandy loam, loamy sand, or sand and gravel.

Coxville Series

The Coxville series consists of poorly drained soils that formed in clayey sediment on uplands. Slope is less than 2 percent.

Typical pedon of Coxville loam, in Hoke County, is 1.1 miles south of Raeford, along N.C. Highway 211, and 500 feet east of highway, in a Carolina bay:

- Ap—0 to 7 inches; dark gray (10YR 4/1) loam; weak fine granular structure; friable; many fine and medium roots; common fine pores; strongly acid; abrupt smooth boundary.
- B_{Ag}—7 to 10 inches; gray (10YR 5/1) sandy clay loam; weak medium subangular blocky structure; friable, slightly sticky; common fine and medium roots; common fine pores; very strongly acid; gradual wavy boundary.
- B_{tg}1—10 to 20 inches; gray (10YR 5/1) sandy clay; few medium distinct yellowish brown (10YR 5/6) mottles; moderate medium subangular blocky structure; firm, sticky; few fine and medium roots; common fine pores; very strongly acid; gradual wavy boundary.
- B_{tg}2—20 to 55 inches; gray (10YR 6/1) clay; common medium distinct yellowish brown (10YR 5/6) and medium prominent red (2.5YR 4/8) mottles; moderate medium subangular blocky structure; firm, sticky; few medium roots; common fine pores; very strongly acid; gradual wavy boundary.
- B_{tg}3—55 to 72 inches; light gray (10YR 7/1) sandy clay and pockets of sandy clay loam; few fine distinct yellowish brown (10YR 5/8) and prominent red (2.5YR 5/8) mottles; weak medium subangular blocky structure; firm, slightly sticky; few clean quartz grains; very strongly acid.

The loamy and clayey horizons are more than 60 inches deep to stratified deposits of the Coastal Plain. Reaction is very strongly acid or strongly acid, except where the surface has been limed.

The Ap or A horizon has hue of 10YR or 2.5Y, value of 4, and chroma of 1 or 2.

The B_{Ag} horizon, where present, has hue of 10YR, value of 5 through 7, and chroma of 1 or 2. It is sandy clay loam. The B_{tg} horizon is similar in color to the B_{Ag} horizon. The B_{tg} horizon is sandy clay or clay. Layers of both textures are commonly present in the same pedon. Some pedons contain thin layers or pockets of sandy clay loam below a depth of 40 inches. Brown, yellow, and red mottles are common throughout the subsoil of most pedons.

Craven Series

The Craven series consists of moderately well drained soils that formed in clayey sediment on uplands. Slope ranges from 1 to 4 percent.

Typical pedon of Craven loam, 1 to 4 percent slopes, in Cumberland County, is along State Road 1710 near a brick company at Slocumb, about 500 feet south of State Road 1710, down company service road near the southeast corner of a large borrow pit:

Ap—0 to 7 inches; brown (10YR 5/3) loam; weak fine granular structure; friable; common fine and medium roots; strongly acid; clear smooth boundary.

Bt1—7 to 23 inches; yellowish brown (10YR 5/6) clay; moderate fine and medium angular blocky and subangular blocky structure; firm, sticky, plastic; common fine and medium roots; few discontinuous clay films on faces of peds and in pores; very shiny ped faces; very strongly acid; gradual wavy boundary.

Bt2—23 to 44 inches; yellowish brown (10YR 5/4) clay; common medium distinct gray (10YR 6/1) mottles; moderate medium angular and subangular blocky structure; firm, sticky, plastic; few fine and medium roots; few discontinuous clay films on faces of peds and in pores; very shiny ped faces; very strongly acid; gradual wavy boundary.

Cg1—44 to 58 inches; gray (10YR 6/1) clay; common fine prominent strong brown (7.5YR 5/8) mottles; massive; firm, sticky, plastic; very strongly acid; gradual wavy boundary.

Cg2—58 to 80 inches; gray (10YR 6/1) clay loam; common fine distinct strong brown (7.5YR 5/6) mottles; massive; firm, sticky, plastic; very strongly acid.

The loamy and clayey horizons are 40 to 60 inches deep to stratified deposits of the Coastal Plain. Reaction is very strongly acid or strongly acid, except where the surface has been limed.

The A or Ap horizon has hue of 10YR, value of 5, and chroma of 1 through 3; or it has value of 4 and chroma of 1 or 2. The E horizon, where present, has hue of 10YR, value of 6 or 7, and chroma of 3 or 4.

The BA horizon, where present, has hue of 10YR or 2.5Y, value of 5 or 6, and chroma of 4. It is loam, clay loam, or silty clay loam. The Bt horizon has hue of 10YR, value of 5 or 6, and chroma of 4 through 8; hue of 2.5Y, value of 5 or 6, and chroma of 4 through 6; or hue of 7.5YR, value of 5, and chroma of 6 through 8. The lower part of the Bt horizon is mottled with gray, brown, or red, or it is dominantly gray. The Bt horizon is clay, silty clay, silty clay loam, or clay loam.

The Cg horizon is gray with red, yellow, or brown mottles. It is clay, clay loam, sandy clay loam, or sandy loam.

Croatan Series

The Croatan series consists of very poorly drained organic soils that formed in highly decomposed organic material underlain by loamy sediment. The Croatan soils are in the Carolina bays. Slope is less than 2 percent.

Typical pedon of Croatan muck, in Cumberland County, approximately 15 miles southeast of Fayetteville, 1.1 miles northeast of the intersection of State Road 2041 and 2042 along State Road 2041, and 1.1 miles southeast, in a large bay:

Oa1—0 to 4 inches; black (10YR 2/1 broken face and rubbed) sapric material; about 10 percent fibers unrubbed and 3 percent rubbed; moderate fine granular structure; very friable; many fine and medium roots; common grains of clean sand; about 50 percent organic material; extremely acid; gradual wavy boundary.

Oa2—4 to 37 inches; black (10YR 2/1 broken face and rubbed) sapric material; about 8 percent fibers unrubbed; less than 4 percent rubbed; massive; very friable; common medium roots; few grains of clean sand; about 50 percent organic material; extremely acid; gradual wavy boundary.

Cg—37 to 80 inches; dark gray (10YR 4/1) sandy loam; massive; friable; extremely acid.

Croatan soils have organic horizons that total 16 to 51 inches in thickness. They are extremely acid, except where the surface has been limed. Logs, stumps, and fragments of wood make up 0 to 10 percent of the organic tiers. Fiber content is less than 25 percent unrubbed and less than 10 percent rubbed. The underlying mineral horizon is extremely acid through slightly acid.

The organic tiers have hue of 7.5YR through 5Y, value of 2 or 3, and chroma of 0 to 2. They typically are massive under natural conditions. When drained and cultivated, granular or blocky structure develops in all or part of the organic tiers.

The mineral horizon has hue of 7.5YR through 5Y, value of 2 through 6, and chroma of 1 through 3. It typically is sandy loam or sandy clay loam. Some pedons contain thin strata of sand or loamy sand.

Deloss Series

The Deloss series consists of very poorly drained soils that formed in loamy sediment on terraces along the Cape Fear and Lower Little Rivers. These soils are in Cumberland County. Slope is less than 2 percent.

Typical pedon of Deloss loam, in Cumberland County, is 2 miles south of Fayetteville on N.C. Highway 87, 0.3 mile west on East Mountain Drive, 150 feet south of the road:

Ap—0 to 10 inches; black (N 2/0) loam; weak fine granular structure; friable; strongly acid; abrupt smooth boundary.

E—10 to 13 inches; dark grayish brown (10YR 4/2) loamy sand; weak medium granular structure; friable; strongly acid; clear smooth boundary.

Btg1—13 to 24 inches; grayish brown (10YR 5/2) sandy clay loam; weak medium subangular blocky structure; friable; common fine flakes of mica; few medium pockets of sandy loam; strongly acid; gradual wavy boundary.

Btg2—24 to 38 inches; light brownish gray (10YR 6/2) sandy clay loam; few fine faint yellowish brown (10YR 5/8) mottles; weak medium subangular blocky structure; friable, slightly sticky; common old roots; very strongly acid; gradual wavy boundary.

Btg3—38 to 48 inches; light gray (5Y 6/1) sandy clay loam; weak medium subangular blocky structure; friable, slightly sticky; few medium pockets of sandy loam; common fine flakes of mica; common old roots; very strongly acid; gradual wavy boundary.

BCg—48 to 72 inches; gray (5Y 5/1) sandy loam; weak medium subangular blocky structure; friable; many fine flakes of mica; common soft mineral grains; very strongly acid.

The loamy horizon is 40 inches to more than 60 inches deep to stratified loamy sediment. Reaction ranges from very strongly acid through slightly acid in all horizons.

The A horizon or Ap horizon has hue of 10YR or 5Y, value of 2 or 3, and chroma of 1 or 2; or it is neutral. The E horizon, where present, has hue of 10YR or 5Y, value of 4 through 7, and chroma of 1 or 2; or it is neutral.

The BE horizon, where present, has hue of 10YR or 2.5Y, value of 2 through 6, and chroma of 1 or 2; or it is neutral. It is sandy clay loam, loam, or fine sandy loam. The Btg horizon has hue of 10YR or 5Y, value of 2 through 7, and chroma of 1 or 2; or it is neutral. It is sandy clay loam, clay loam, or fine sandy loam. Some Btg horizons have thin layers of sandy clay.

The BCg horizon has hue of 10YR or 5Y, value of 4 through 7, and chroma of 1 or 2; or it is neutral. Texture ranges from sand to clay.

Dogue Series

The Dogue series consists of moderately well drained soils that formed in clayey sediment on terraces along Cape Fear and Lower Little Rivers. These soils are in Cumberland County. Slope is less than 2 percent.

Typical pedon of Dogue fine sandy loam, 0 to 2 percent slopes, in Cumberland County, is about 4 miles northeast of Fayetteville, 0.9 mile southwest of the intersection of State Road 1725 and railroad tracks, 400 feet southeast of the tracks, in the woods:

Oi—1 inch to 0; mixture of undecomposed pine needles and hardwood leaves.

A—0 to 4 inches; dark grayish brown (10YR 4/2) fine sandy loam; moderate fine granular structure; very friable; many fine and medium roots; strongly acid; clear smooth boundary.

Bt1—4 to 11 inches; light yellowish brown (2.5Y 6/4) clay loam; weak fine subangular blocky structure; friable, slightly sticky; many fine and medium roots; strongly acid; clear smooth boundary.

Bt2—11 to 25 inches; reddish yellow (7.5YR 6/8) clay; common medium distinct gray (10YR 6/1) mottles; moderate medium subangular blocky structure; firm, sticky; common fine roots; strongly acid; clear smooth boundary.

Bt3—25 to 55 inches; mottled strong brown (7.5YR 5/8) and light gray (10YR 7/1) clay loam; weak medium subangular blocky structure; firm, sticky; very strongly acid; clear smooth boundary.

C—55 to 72 inches; strong brown (7.5YR 5/6) sandy clay loam; many medium distinct light gray (10YR 7/1) mottles; massive; friable, slightly sticky; very strongly acid.

The loamy and clayey horizons are 40 to 60 inches deep to stratified sediment. Reaction ranges from extremely acid through strongly acid in all horizons, except where the surface has been limed.

The A or Ap horizon has hue of 10YR or 2.5Y, value of 4 or 5, and chroma of 2 or 3. The E horizon, where present, has hue of 10YR or 2.5Y, value of 5 through 7, and chroma of 4 through 6.

The BA horizon, where present, has hue of 10YR or 2.5Y, value of 5 through 7, and chroma of 4 through 8. It is clay loam or sandy clay loam. The Bt horizon has hue of 7.5YR through 2.5Y, value of 4 through 6, and chroma of 4 through 8. The lower part of the Bt horizon typically is mottled in shades of gray, brown, or red. The Bt horizon is clay, clay loam, sandy clay, or sandy clay loam. The BC horizon, where present, has colors similar to the Bt horizon. It usually is sandy clay loam, but it may range to clay loam, sandy clay, or sandy loam.

The C horizon typically is strong brown mottled with gray, or it is gray mottled with red or brown. Texture ranges from sand to sandy clay loam.

Dothan Series

The Dothan series consists of well drained soils that formed in unconsolidated loamy or clayey sediment on uplands. Slope ranges from 0 to 2 percent.

Typical pedon of Dothan loamy sand, 0 to 2 percent slopes, in Hoke County, is 6 miles west of Montrose, 0.8 mile west of the intersection of State Road 1225 and U.S. Highway 15-501 along State Road 1225, and 150 feet south of the road:

Ap—0 to 7 inches; dark grayish brown (10YR 4/2) loamy sand; weak fine granular structure; very friable; few fine and medium roots; slightly acid; abrupt smooth boundary.

E—7 to 11 inches; light yellowish brown (2.5Y 6/4) loamy sand; weak fine granular structure; very friable; few fine and medium roots; strongly acid; clear smooth boundary.

Bt1—11 to 25 inches; yellowish brown (10YR 5/6) sandy clay loam; weak fine subangular blocky structure;

friable, slightly sticky; common fine roots; few fine continuous pores; thin patchy clay films on faces of peds; few hard plinthite nodules; strongly acid; gradual wavy boundary.

Bt2—25 to 38 inches; yellowish brown (10YR 5/8) sandy clay loam; few medium distinct strong brown (7.5YR 5/8) and red (2.5YR 5/8) mottles; weak fine and medium subangular blocky structure; firm, brittle in 20 percent of the mass, slightly sticky; few fine continuous pores; thin patchy clay films on faces of peds; few hard plinthite nodules; about 10 percent plinthite; very strongly acid; gradual wavy boundary.

Bt3—38 to 63 inches; yellowish brown (10YR 5/8) sandy clay loam; common medium distinct strong brown (7.5YR 5/8), red (2.5YR 4/8), and pale brown (10YR 6/3) mottles; weak coarse subangular blocky structure; firm, brittle in 20 percent of the mass; few fine discontinuous pores; thin patchy clay films on faces of peds; few hard plinthite nodules; plinthite makes up about 20 percent of the horizon; strongly acid; gradual wavy boundary.

Bt4—63 to 72 inches; yellowish brown (10YR 5/8) sandy clay loam; common coarse distinct red (2.5YR 4/8), strong brown (7.5YR 5/8), and light gray (10YR 7/1) mottles; weak coarse subangular blocky structure; firm, brittle in 20 percent of the mass; few fine discontinuous pores; plinthite makes up about 25 percent of horizon; red areas are brittle and hard; very strongly acid.

The sandy and loamy horizons are more than 60 inches deep to stratified deposits of the Coastal Plain. Reaction is very strongly acid or strongly acid, except where the surface has been limed.

The Ap horizon has hue of 10YR, value of 4 through 7, and chroma of 2 through 4. In places hue is 2.5Y, value is 5 or 6, and chroma is 4, or value is 4, and chroma is 2. The A horizon, where present, has hue of 10YR, value of 3 through 5, and chroma of 2 or 3. The E horizon has the same color range as the Ap horizon.

The upper part of the Bt horizon has hue of 10YR, value of 5 or 6, and chroma of 6 through 8. The lower part has hue of 10YR, value of 5, and chroma of 4 through 8; or it has value of 7 and chroma of 6 through 8 and commonly is mottled in shades of red, white, brown, and gray. It contains 5 to 35 percent, by volume, nonindurated plinthite. The Bt horizon is sandy clay loam, clay loam, or sandy loam. In some pedons, the lower part of the Bt horizon is sandy clay.

Dunbar Series

The Dunbar series consists of somewhat poorly drained soils that formed in clayey sediment on uplands. Slope ranges from 0 to 2 percent.

Typical pedon of Dunbar loam, in Cumberland County, is 1 mile east of Cedar Creek, 0.1 mile south of the

intersection of State Road 2023 and State Road 2024 along State Road 2024, 100 feet west of the road:

Oi—1 inch to 0; partially decomposed leaves of mixed hardwoods, pine needles, and other organic matter.

A—0 to 3 inches; dark grayish brown (10YR 4/2) loam; moderate medium granular structure; friable; common fine and many medium and coarse roots; very strongly acid; clear smooth boundary.

E—3 to 10 inches; brown (10YR 5/3) loam; common medium faint light brownish gray (10YR 6/2) and few fine faint yellowish brown (10YR 5/8) mottles; weak fine subangular blocky structure; friable; common fine and medium roots; very strongly acid; clear wavy boundary.

Bt—10 to 17 inches; pale brown (10YR 6/3) clay loam; common medium distinct yellowish brown (10YR 5/8); few medium faint light brownish gray (10YR 6/2) and few medium prominent red (2.5YR 4/8) mottles; moderate coarse subangular blocky structure parting to moderate fine angular blocky; firm, sticky, plastic; common fine and medium roots; common clay films on faces of peds; very strongly acid; gradual wavy boundary.

Btg1—17 to 48 inches; light gray (10YR 7/1) and gray (10YR 5/1) clay; common medium prominent red (2.5YR 4/8) and strong brown (7.5YR 5/8) mottles; moderate coarse subangular blocky structure parting to moderate fine angular blocky; firm, sticky, plastic; few fine roots; common clay films on faces of peds; very strongly acid; gradual wavy boundary.

Btg2—48 to 72 inches; light gray (10YR 7/1) and gray (10YR 5/1) clay; many coarse prominent yellowish brown (10YR 5/8), common fine distinct strong brown (7.5YR 5/6), and few fine distinct yellowish red (5YR 5/8) mottles; weak fine angular blocky structure; firm, sticky, plastic; few streaks of white (10YR 8/2) silt or fine sand; very strongly acid.

The loamy and clayey horizons are more than 60 inches deep to stratified deposits of the Coastal Plain. Reaction is very strongly acid or strongly acid, except where the surface has been limed.

The A or Ap horizon has hue of 10YR or 2.5Y, value of 4 or 5, and chroma of 2; or it has value of 4 and chroma of 1. Where the A or Ap horizon is less than 10 inches thick, hue can be 10YR; value, 2 or 3; and chroma, 1. The E horizon, where present, has hue of 10YR, value of 4 through 6, and chroma of 1 through 3.

The upper part of the Bt horizon has hue of 10YR, value of 5 or 6, and chroma of 3 through 8; or it has hue of 2.5Y, value of 5 or 6, and chroma of 4 through 6. The upper part has few to many gray mottles indicative of wetness. The lower part of the Bt horizon has hue of 10YR, value of 4 through 7, and chroma of 1 or value of 7 and chroma of 2; or it has hue of 2.5Y, value of 7, and chroma of 2. The lower part has few to many yellow,

brown, or red mottles. The Bt horizon is clay, sandy clay, or clay loam. The BCg horizon, where present, is similar in color to the lower part of the Bt horizon. It is sandy clay, sandy clay loam, clay loam, or clay.

Duplin Series

The Duplin series consists of moderately well drained soils that formed in clayey sediment on uplands. Slope ranges from 0 to 3 percent.

Typical pedon of Duplin sandy loam, 0 to 3 percent slopes, in Cumberland County, is 0.8 mile northeast of Cedar Creek, 50 feet northwest of the intersection of State Road 2023 and State Road 2017:

Oi—1/2 inch to 0; partially decomposed oak leaves and pine needles.

A—0 to 3 inches; dark gray (10YR 4/1) sandy loam; weak fine granular structure; friable; common fine and few medium roots; very strongly acid; abrupt smooth boundary.

E—3 to 6 inches; pale brown (10YR 6/3) sandy loam; weak fine granular structure; friable; common fine and few medium roots; very strongly acid; clear smooth boundary.

Bt1—6 to 20 inches; yellowish brown (10YR 5/4) sandy clay; few fine distinct strong brown (7.5YR 5/8) mottles; weak medium subangular blocky structure; friable, sticky; common fine and medium roots; few fine pores; few coarse quartz grains; few thin clay films on faces of peds and in pores; few fine charcoal fragments; very strongly acid; gradual wavy boundary.

Bt2—20 to 36 inches; light yellowish brown (10YR 6/4) sandy clay; common medium distinct light brownish gray (10YR 6/2) and few medium distinct strong brown (7.5YR 5/6) mottles; weak medium subangular blocky structure; firm, sticky; few fine and medium roots; few fine pores; few coarse quartz grains; few thin clay films on faces of peds and in pores; few fine charcoal fragments; strongly acid; gradual wavy boundary.

Bt3—36 to 65 inches; mottled yellowish brown (10YR 5/8), yellowish red (5YR 5/8), and light brownish gray (2.5Y 6/2) sandy clay; weak medium subangular blocky structure; firm, sticky; strongly acid; gradual wavy boundary.

The loamy and clayey layers are more than 60 inches deep to stratified deposits of the Coastal Plain. Reaction is very strongly acid or strongly acid in all horizons, except where the surface has been limed.

The A or Ap horizon has hue of 10YR or 2.5Y, value of 4 or 5, and chroma of 1 or 2. The E horizon, where present, has hue of 10YR or 2.5Y, value of 4 through 6, and chroma of 2 or 3.

The BE horizon, where present, has hue of 10YR or 2.5Y and value and chroma of 4 through 6. It is sandy

clay loam or clay loam. The Bt horizon has hue of 10YR, value of 4 through 8, and chroma of 3 or more. Gray mottles that have value of 5 through 7 and chroma of 2 or less are within 30 inches of the surface. In some pedons, the lower part of the Bt horizon is dominantly gray. The Bt horizon is sandy clay, clay loam, or clay.

Dystrochrepts

Dystrochrepts consists of well drained soils that formed on steep bluffs and in deep gullies above Cape Fear River and its major tributaries. These soils are in Cumberland County. Dystrochrepts soils formed in sediment deposited by the river. They are on slopes exposed when the river cut down through its own alluvium. Slope ranges from 15 to 60 percent.

Reference pedon of Dystrochrepts, steep, in Cumberland County, is in northeast Fayetteville, 0.25 mile southwest of the intersection of Cape Fear River and U.S. Highway 301 (I-95), 0.25 mile south of the highway, in Pope Park, on the northeast-facing side of a large gully:

Oi—2 inches to 0; decomposed hardwood leaves and twigs.

A—0 to 4 inches; very dark grayish brown (10YR 3/2) loam; strong fine granular structure; friable; many fine and medium roots; very strongly acid; clear smooth boundary.

Bw1—4 to 25 inches; strong brown (7.5YR 5/6) sandy loam; strong medium granular structure; friable; common flakes of mica; extremely acid; gradual irregular boundary.

Bw2—25 to 40 inches; yellowish red (5YR 5/8) sandy loam; weak fine granular structure; friable; common flakes of mica; extremely acid; clear wavy boundary.

C1—40 to 50 inches; strong brown (7.5YR 5/8) coarse sand; single grained; loose; common fine gravel coated with sand; very strongly acid; gradual broken boundary.

C2—50 to 72 inches; strong brown (7.5YR 5/8) extremely gravelly sand; loose; some gravel coated with sand; very strongly acid.

The loamy horizons are 30 inches to more than 60 inches deep to stratified sediment deposited by the river. The soils are extremely acid through strongly acid in all horizons.

The A horizon has hue of 10YR, value of 3 or 4, and chroma of 1 or 2.

The Bw horizon has hue of 5YR through 10YR, value of 4 through 6, and chroma of 4 through 8. It ranges from sandy loam through clay loam.

The C horizon is similar in color to the Bw horizon or is gray. Texture ranges from coarse sand through sandy clay loam. Some pedons have a high content of gravel.

Exum Series

The Exum series consists of moderately well drained soils that formed in loamy and silty sediment on uplands. Slope ranges from 0 to 2 percent.

Typical pedon of Exum loam, 0 to 2 percent slopes, in Cumberland County, is about 1.5 miles northwest of Godwin, 0.25 mile north of a Civil War historical marker on N.C. Highway 82, and 120 feet west of the road:

- Ap—0 to 9 inches; grayish brown (2.5Y 5/2) loam; weak fine granular structure; very friable; common fine roots; medium acid; clear smooth boundary.
- E—9 to 12 inches; light brownish gray (2.5Y 6/2) loam; weak fine granular structure; very friable; few fine roots; slightly acid; clear wavy boundary.
- Bt1—12 to 23 inches; light yellowish brown (2.5Y 6/4) clay loam; few medium distinct brownish yellow (10YR 6/6) mottles; moderate medium subangular blocky structure; friable; few fine roots; thin discontinuous clay films on faces of peds; strongly acid; gradual wavy boundary.
- Bt2—23 to 37 inches; light olive brown (2.5Y 5/4) clay loam; common medium distinct red (2.5YR 4/8) and gray (10YR 6/1) mottles and common medium faint brownish yellow (10YR 6/6) mottles; moderate medium subangular blocky structure; friable; thin discontinuous clay films on faces of peds; strongly acid; gradual wavy boundary.
- Bt3—37 to 50 inches; yellowish brown (10YR 5/8) clay loam; common medium distinct gray (10YR 6/1) mottles and few medium distinct red (2.5YR 5/8) mottles; moderate medium subangular blocky structure; thin discontinuous clay films on faces of peds; friable; strongly acid; gradual wavy boundary.
- Bt4—50 to 69 inches; mottled yellowish brown (10YR 5/8), gray (10YR 6/1), red (10R 4/6), and grayish brown (2.5Y 5/2) clay loam; moderate medium subangular blocky and angular blocky structure; friable; thin discontinuous clay films on faces of peds; strongly acid; gradual wavy boundary.
- BCg—69 to 75 inches; mottled light gray (10YR 7/1), yellowish brown (10YR 5/8), and red (10R 4/6) clay loam; weak medium subangular blocky structure; friable; firm; strongly acid.

The loamy and silty horizons are more than 60 inches deep to stratified sediment of the Coastal Plain. Reaction is very strongly acid or strongly acid, except where the surface layer has been limed.

The A or Ap horizon has hue of 2.5Y, value of 4 or 5, and chroma of 2; or it has hue of 10YR, value of 4 or 5, and chroma of 1 or 2. The E horizon, where present, has hue of 2.5Y, value of 6, and chroma of 2 or 4; or it has hue of 10YR, value of 6, and chroma of 2 through 4 or value of 7 and chroma of 3 or 4.

The BE horizon, where present, and the Bt horizon have hue of 10YR, value of 5 through 7, and chroma of

3 through 8; or it has hue of 2.5Y, value of 5 or 6, and chroma of 4 through 6. Gray mottles are present within 30 inches of the surface. The lower part of the Bt horizon is dominantly gray in some pedons. The BE and Bt horizons are loam, clay loam, or silty clay loam. The lower part of the Bt horizon is silty clay or clay in some pedons. The BCg horizon is mottled with gray, yellow, brown, yellowish red, or red, or is dominantly gray. It is loam, clay loam, or clay.

Faceville Series

The Faceville series consists of well drained soils that formed in clayey sediment on uplands. Slope ranges from 0 to 6 percent.

Typical pedon of Faceville loamy sand, 2 to 6 percent slopes, in Cumberland County, on the west side of Fayetteville, 0.5 mile west of Morganton Road Elementary School on Morganton Road, and 100 feet north of the road:

- Ap—0 to 7 inches; grayish brown (10YR 5/2) loamy sand; weak fine granular structure; very friable; common fine and few medium roots; medium acid; abrupt smooth boundary.
- E—7 to 17 inches; pale brown (10YR 6/3) loamy sand; weak fine granular structure; very friable; common fine and few medium roots; some mixing of material from horizons above and below, in old root channels; slightly acid; clear smooth boundary.
- Bt1—17 to 52 inches; yellowish red (5YR 4/8) sandy clay; moderate medium subangular blocky structure; friable; few fine and medium roots; thin clay films on faces of peds; very strongly acid; gradual wavy boundary.
- Bt2—52 to 70 inches; yellowish red (5YR 5/8) sandy clay; few medium distinct brownish yellow (10YR 6/8) and red (2.5YR 5/8) mottles; moderate medium subangular blocky structure; friable; very strongly acid.

Sandy and clayey horizons are more than 60 inches deep to stratified sediment of the Coastal Plain. Reaction is very strongly acid or strongly acid, except where the surface layer has been limed.

The Ap or A horizon has hue of 10YR, value of 5, and chroma of 2 or value of 4, and chroma of 2 through 4. In eroded areas, the Ap horizon has hue of 7.5YR, value of 5, and chroma of 6 or 8; or it has hue of 5YR, value of 4 or 5, and chroma of 6 or 8. The E horizon, where present, has hue of 7.5YR or 10YR, value of 6, and chroma of 3 or 4.

The BE horizon, where present, has hue of 7.5YR, value of 5, and chroma of 6 or 8; or it has hue of 5YR or 2.5YR, value of 4 or 5, and chroma of 6 or 8. It is sandy loam or sandy clay loam. The Bt horizon has hue of 5YR or 2.5YR, value of 4 or 5, and chroma of 4 through 8.

Common brown and yellow mottles are in some pedons. The Bt horizon is sandy clay, clay, or clay loam. The BC horizon, where present, is mottled in shades of red, yellow, and brown. It is sandy clay, sandy clay loam, or sandy loam. In some pedons, the BC horizon contains 1 to 4 percent plinthite.

Fuquay Series

The Fuquay series consists of well drained soils that formed in sandy and loamy sediment on uplands. Slope ranges from 0 to 4 percent.

Typical pedon of Fuquay sand, 0 to 4 percent slopes, in Hoke County, 1 mile southwest of Montrose on State Road 1215, and 100 feet west of the road:

- A1—0 to 3 inches; dark gray (10YR 4/1) sand; single grained; loose; common fine roots; few medium and coarse roots; strongly acid; clear smooth boundary.
- E—3 to 29 inches; light yellowish brown (2.5Y 6/4) sand; single grained; loose; few fine and medium roots; very strongly acid; clear smooth boundary.
- BE—29 to 42 inches; yellowish brown (10YR 5/6) sandy loam; few medium distinct strong brown (7.5YR 5/6) and red (2.5YR 4/8) mottles in the lower part; weak fine subangular blocky structure; friable; few fine roots; few fine continuous pores; very strongly acid; gradual wavy boundary.
- Bt1—42 to 60 inches; yellowish brown (10YR 5/8) sandy clay loam; common medium distinct strong brown (7.5YR 5/8), gray (10YR 6/1), and red (2.5YR 4/8) mottles; weak medium subangular blocky structure breaking to weak fine subangular blocky structure; firm, brittle in 20 percent of the mass; thin patchy clay films on faces of peds; few fine pores; plinthite makes up about 25 percent of this horizon; red areas are brittle and hard; very strongly acid; gradual wavy boundary.
- Bt2—60 to 80 inches; mottled strong brown (7.5YR 5/6), gray (10YR 6/1), and red (2.5YR 4/8) sandy clay loam; weak coarse subangular blocky structure; firm, brittle in 20 percent of the mass; few fine discontinuous pores; thin patchy clay films on faces of peds; plinthite makes up about 30 percent of this horizon; strong brown and red areas are hard and brittle; gray areas are friable sandy clay loam; very strongly acid.

The sandy and loamy horizons are more than 60 inches deep to stratified sediment of the Coastal Plain. Reaction is very strongly acid or strongly acid, except where the surface has been limed.

The Ap or A horizon has hue of 2.5Y, value of 4 or 5, and chroma of 2; or it has hue of 10YR, value of 4 or 5, and chroma of 1 or 2. The E horizon has hue of 10YR, value of 6 or 7, and chroma of 3 through 6 or value of 5 and chroma of 4 through 6; or it has hue of 2.5Y, value of 5 through 7, and chroma of 4 through 6.

The BE horizon, where present, has hue of 10YR, value of 5, and chroma of 3 through 8. It is sandy loam or sandy clay loam. The upper part of the Bt horizon has hue of 10YR or 7.5YR, value of 5, and chroma of 3 through 8. The lower part of the Bt horizon commonly is mottled in shades of red, yellowish brown, brownish yellow, strong brown, or gray. It contains 5 to 30 percent plinthite. The Bt horizon is sandy clay loam or sandy loam. Thin layers of sandy loam are common, especially immediately above the plinthic horizons.

Gilead Series

The Gilead series consists of moderately well drained soils that formed in clayey sediment on uplands. Slope ranges from 2 to 25 percent.

Typical pedon of Gilead loamy sand, 2 to 8 percent slopes, in Hoke County, is 15 miles north of Raeford on Fort Bragg Military Reservation; 1.3 miles east of the intersection of Inverness Road and Manchester Road, along Manchester Road, 1.1 miles north along a sand road, and 300 feet east of the road:

- Oi—1 inch to 0; undecomposed pine needles and leaves.
- A—0 to 4 inches; dark gray (10YR 4/1) loamy sand; weak fine granular structure; very friable; many fine and medium roots; very strongly acid; clear wavy boundary.
- E—4 to 13 inches; light yellowish brown (10YR 6/4) loamy sand; weak fine granular structure; very friable; many fine and medium roots; very strongly acid; clear wavy boundary.
- Bt1—13 to 21 inches; brownish yellow (10YR 6/6) sandy clay; weak medium subangular blocky structure; firm, slightly brittle; few medium roots; few flakes of mica; many coarse angular sand grains; strongly acid; clear wavy boundary.
- Bt2—21 to 32 inches; mottled strong brown (7.5YR 5/6), brownish yellow (10YR 6/6), and light gray (10YR 7/2) sandy clay and sandy clay loam; weak medium subangular blocky structure; very firm, brittle; few to common flakes of mica; many coarse angular sand grains; strongly acid; clear wavy boundary.
- BC—32 to 70 inches; reddish yellow (7.5YR 6/6) and light yellowish brown (10YR 6/4) sandy loam; weak fine subangular blocky structure; very friable; common fine flakes of mica; strongly acid; gradual wavy boundary.

The sandy, loamy, and clayey horizons are 36 to 80 inches deep to stratified sediment or discontinuities of clay. Reaction is very strongly acid or strongly acid, except where the surface has been limed.

The Ap or A horizon has hue of 10YR or 2.5Y, value of 4 through 6, and chroma of 1 through 3. The E horizon, where present, has hue of 10YR or 2.5Y, value of 5 through 7, and chroma of 2 through 4.

The upper part of the Bt horizon has hue of 10YR, value of 5 or 6, and chroma of 4 through 6; or it has hue of 2.5Y, value of 5, and chroma of 4 through 6. Few to common red, brown, yellow, gray, or white mottles are present in most pedons. The lower part of the Bt horizon is similar in color to the upper part or is mottled or variegated with gray, brown, yellow, red, and white. The Bt horizon is sandy clay, clay, or clay loam and contains brittle subhorizons in most pedons. The BC horizon, where present, is similar in color to the Bt horizon or is gray. It is sandy loam, sandy clay loam, or clay loam.

Goldsboro Series

The Goldsboro series consists of moderately well drained soils that formed in loamy sediment on uplands. Slope is less than 2 percent.

Typical pedon of Goldsboro loamy sand, 0 to 2 percent slopes, in Hoke County, about 8 miles southeast of Raeford, 0.2 mile south from the intersection of H.C. Highway 20 and State Road 1436 on State Road 1436, and 600 feet east of the road:

- Ap—0 to 11 inches; dark grayish brown (10YR 4/2) loamy sand; weak fine granular structure; very friable; many fine roots; mildly alkaline; abrupt smooth boundary.
- Bt1—11 to 18 inches; yellowish brown (10YR 5/4) sandy clay loam; weak fine subangular blocky structure; friable; common fine roots; many fine discontinuous pores; medium acid; gradual smooth boundary.
- Bt2—18 to 26 inches; yellowish brown (10YR 5/4) sandy clay loam; common medium faint brown (10YR 5/3) mottles; weak fine subangular blocky structure; friable; common fine roots; many fine discontinuous pores; strongly acid; gradual smooth boundary.
- Bt3—26 to 46 inches; yellowish brown (10YR 5/6) sandy clay loam; common medium distinct grayish brown (10YR 5/2) mottles; weak fine subangular blocky structure; friable; strongly acid; gradual wavy boundary.
- Btg—46 to 66 inches; gray (10YR 6/1) sandy clay loam; common medium distinct yellowish brown (10YR 5/6) mottles; weak fine subangular blocky structure; friable; very strongly acid; gradual wavy boundary.
- BCg—66 to 72 inches; gray (10YR 6/1) sandy loam; common medium distinct brownish yellow (10YR 6/6) mottles; weak fine granular structure; friable; very strongly acid.

The sandy and loamy horizons are 60 inches to more than 100 inches deep to stratified deposits of the Coastal Plain. Reaction is very strongly acid or strongly acid, except where the surface has been limed.

The Ap or A horizon has hue of 10YR, value of 4 through 6, and chroma of 1 or 2; or it has hue of 2.5Y, value of 5 or 6, and chroma of 2. Where present, the E horizon has hue of 10YR, value of 6 or 7, and chroma of

3 or 4; or it has hue of 2.5Y, value of 6, and chroma of 2 through 4.

The Bt horizon has hue of 10YR, value of 5 or 6, and chroma of 4 through 6; or it has hue of 2.5Y, value of 5, and chroma of 4 through 6. The Btg horizon has hue of 10YR, value of 5 or 6, and chroma of 1 or 2 and mottles of high contrast. Gray mottles range in depth from 18 to 30 inches. The Bt horizon and the Btg horizon are sandy clay loam or sandy loam. The BCg horizon, where present, has hue of 10YR, value of 5 or 6, and chroma of 1 or 2; or it has hue of 2.5Y, value of 5 or 6, and chroma of 2. It is sandy loam that has strata of sand or sandy clay loam.

Grantham Series

The Grantham series consists of poorly drained soils that formed in loamy and silty sediment on uplands. Slope ranges from 0 to 2 percent.

Typical pedon of Grantham loam, in Cumberland County, is 0.75 mile west of the intersection of State Road 2040 and Whitted Road along Whitted Road, and 300 feet south of road, in pine plantation:

- Oi—1 inch to 0; dark gray (10YR 4/1) partially decomposed organic matter.
- A—0 to 5 inches; dark gray (10YR 4/1) loam; moderate fine granular structure; very friable; slightly sticky; many fine roots; very strongly acid; abrupt smooth boundary.
- BAG—5 to 11 inches; gray (10YR 6/1) silt loam; fine medium subangular blocky structure; friable, slightly sticky; few fine roots; very strongly acid; gradual wavy boundary.
- Btg1—11 to 36 inches; gray (10YR 6/1) clay loam; common medium distinct brownish yellow (10YR 6/8) mottles; weak medium subangular blocky structure; firm, sticky; very strongly acid; gradual wavy boundary.
- Btg2—36 to 55 inches; gray (10YR 6/1) clay loam; common medium prominent red (2.5YR 4/8) and many medium distinct strong brown (7.5YR 5/8) mottles; weak medium subangular blocky structure; firm, very sticky; very strongly acid; gradual wavy boundary.
- BCg—55 to 72 inches; gray (10YR 6/1) clay loam; common medium distinct reddish yellow (7.5YR 6/8) mottles; weak medium subangular blocky structure; extremely firm, sticky; very strongly acid.

The loamy layer is more than 60 inches deep to stratified deposits of the Coastal Plain. Reaction is very strongly acid or strongly acid, except where the surface has been limed.

The A or Ap horizon has hue of 10YR, value of 3 or 4, and chroma of 1 or 2. The E horizon, where present, has hue of 10YR, value of 5 through 7, and chroma of 1 or 2.

The BAg horizon, where present, has hue of 10YR, value of 5 through 7, and chroma of 1 or 2. Few to common yellow and brown mottles are present in some pedons. The BAg horizon is loam or silt loam. The Btg horizon has hue of 10YR, value of 5 to 7, and chroma of 1 or 2. Mottles are in shades of yellow, brown, or red. The Btg horizon is clay loam or loam.

The BCg horizon is similar to the Btg horizon in color and texture. It is gray and contains yellow, brown, and red mottles in most pedons. It is variable in texture. It consists of layers of sand, sandy loam, sandy clay loam, silty clay loam, or clay.

Johnston Series

The Johnston series consists of very poorly drained soils that formed in loamy, stratified fluvial sediment on flood plains along streams. This soil is on the Coastal Plain. Slope is less than 2 percent.

Typical pedon of Johnston loam, in Cumberland County, is approximately 8 miles southeast of Fayetteville, 0.2 mile west of the intersection of State Road 2018 and State Road 2019 along State Road 2018, and 100 feet north of the road:

- A—0 to 42 inches; very dark gray (10YR 3/1) loam; weak fine granular structure; friable; strongly acid; clear wavy boundary.
- ACg—42 to 52 inches; dark grayish brown (10YR 4/2) sandy loam; massive; friable; strongly acid; clear wavy boundary.
- Cg—52 to 80 inches; light brownish gray (10YR 6/2) sand; lenses and pockets of loamy sand and sandy loam; single grained; loose; very strongly acid.

The loamy horizon is 24 inches to more than 50 inches deep to stratified deposits of the Coastal Plain. Reaction is very strongly acid or strongly acid throughout.

The A horizon has hue of 10YR, value of 3, and chroma of 1 or 2 or value of 2 and chroma of 1.

The ACg horizon, where present, has hue of 10YR, value of 4, and chroma of 1 or 2. It is sandy loam, loamy sand, or loamy fine sand.

The Cg horizon has hue of 10YR, value of 4, and chroma of 1 or 2 or value of 6 and chroma of 2. It is sandy loam, loamy sand, or sand. Layers of sandy clay loam or clay loam are present in some pedons.

Kalmia Series

The Kalmia series consists of well drained soils that formed in sandy fluvial sediment on terraces of Lower Little River and Rockfish Creek. Slope ranges from 0 to 2 percent.

Typical pedon of Kalmia loamy sand, 0 to 2 percent slopes, in Cumberland County, about 5 miles south of Fayetteville on U.S. Highway 301, 2.5 miles east on

State Road 2220, 0.2 mile northwest along farm road, and 100 feet south of road:

- Ap—0 to 9 inches; dark grayish brown (10YR 4/2) loamy sand; weak fine granular structure; very friable; common fine roots; slightly acid; abrupt smooth boundary.
- E—9 to 14 inches; light yellowish brown (2.5Y 6/4) loamy sand; weak fine granular structure; very friable; few fine roots; slightly acid; clear wavy boundary.
- Bt—14 to 34 inches; yellowish brown (10YR 5/6) sandy clay loam; weak medium subangular blocky structure; friable; few fine flakes of mica; very strongly acid; gradual wavy boundary.
- C1—34 to 38 inches; light yellowish brown (2.5Y 6/4) loamy sand; weak fine granular structure; very friable; common medium pockets and lenses of light gray (10YR 7/1) clean sand grains; few fine flakes of mica; very strongly acid; clear wavy boundary.
- C2—38 to 80 inches; brownish yellow (10YR 6/6) sand; single grained; loose; few fine flakes of mica; common fine red and pink opaques; very strongly acid.

The sandy and loamy horizons are 20 to 40 inches deep to stratified deposits along streams. Reaction is very strongly acid through medium acid in all horizons, except where the surface has been limed.

The Ap or A horizon has hue of 10YR, value of 4 through 6, and chroma of 1 or 2. The E horizon has hue of 10YR, value of 5 through 8, and chroma of 3 or 4; or it has hue of 2.5Y, value of 6, and chroma of 4.

The Bt horizon has hue of 10YR, value of 5 or 6, and chroma of 4 through 8; or it has hue of 7.5YR, value of 5, and chroma of 6 through 8. It is sandy clay loam or sandy loam.

The C horizon is sand or loamy sand. Few to common, fine and medium pebbles are present in some pedons.

Kenansville Series

The Kenansville series consists of well drained soils that formed in loamy, fluvial sediment on terraces along Lower Little River and Rockfish Creek. Slope ranges from 0 to 3 percent.

Typical pedon of Kenansville loamy sand, 0 to 3 percent slopes, in Cumberland County, about 5 miles south of Fayetteville on U.S. Highway 301, 3 miles east along State Road 2220, and 50 feet south of road:

- Ap—0 to 8 inches; grayish brown (10YR 5/2) loamy sand; weak fine granular structure; very friable; few fine roots; slightly acid; clear smooth boundary.
- E—8 to 24 inches; very pale brown (10YR 7/3) loamy sand; weak fine granular structure; very friable; few fine roots; strongly acid; clear wavy boundary.

- Bt—24 to 39 inches; yellowish brown (10YR 5/6) sandy loam; weak fine subangular blocky structure; friable; few fine flakes of mica; strongly acid; gradual wavy boundary.
- BC—39 to 50 inches; yellowish brown (10YR 5/4) loamy sand; weak fine granular structure; very friable; few fine flakes of mica; very strongly acid; gradual wavy boundary.
- C1—50 to 62 inches; brownish yellow (10YR 6/6) sand; single grained; loose; common fine flakes of mica; very strongly acid; gradual wavy boundary.
- C2—62 to 71 inches; white (10YR 8/2) sand; single grained; loose; strongly acid; gradual wavy boundary.
- C3—71 to 80 inches; light gray (10YR 7/1) sand; single grained; loose; medium acid.

The sandy and loamy horizons are 40 to 60 inches deep to stratified deposits along the river. Reaction is very strongly acid through medium acid in all horizons, except where the surface has been limed.

The Ap or A horizon has hue of 10YR, value of 4 or 5, and chroma of 1 or 2. The E horizon has hue of 10YR, value of 6 through 8, and chroma of 3 or value of 5 through 8 and chroma of 4.

The Bt horizon has hue of 10YR, value of 5 or 6, and chroma of 4 through 8. It is sandy loam. The BC and C horizons are similar in color to the Bt horizon or have hue of 10YR, value of 7, and chroma of 1 or value of 8 and chroma of 2. They are loamy sand or sand.

Kureb Series

The Kureb series consists of excessively drained soils that formed in sandy deposits of uplands. Slope ranges from 1 to 8 percent.

Typical pedon of Kureb sand, 1 to 8 percent slopes, in Cumberland County, is about 9 miles southeast of Fayetteville, on N.C. Highway 210, 0.5 mile southeast of The Church of God of Prophecy, and 50 feet west of the road:

- Oi—1/2 inch to 0; layer of mixed oak leaves, moss, lichen, and twigs.
- A—0 to 4 inches; gray (10YR 5/1) sand; single grained; loose; clean sand grains and organic matter has a salt and pepper appearance; many fine and common medium roots; neutral; clear wavy boundary.
- E—4 to 24 inches; light gray (10YR 7/1) sand; single grained; loose; common fine and medium roots; few fine fragments of charcoal; few fine pink and red minerals; neutral; clear irregular boundary.
- C/Bh—24 to 58 inches; brownish yellow (10YR 6/6) sand; coarse, irregular dark brown (7.5YR 4/4, 4/2) lumps or (Bh) bodies of very friable organic coated sand make up about 20 percent of this horizon; few lenses and pockets of uncoated sand grains in

vertical tongues extending from AE; single grained; loose; slightly acid; gradual irregular boundary.

- C—58 to 82 inches; light yellowish brown (10YR 6/4) sand; few medium irregular dark brown (7.5YR 4/4, 3/2) lumps or bodies of very friable organic coated sand that make up less than 5 percent of this horizon; single grained; loose; slightly acid.

The sandy horizon is more than 80 inches thick. The 10- to 40-inch control section contains less than 5 percent silt, plus clay. Reaction ranges from strongly acid through neutral in all horizons.

The A horizon has hue of 10YR, value of 3 through 6, and chroma of 1. The E horizon has hue of 10YR, value of 7 or 8, and chroma of 1 or 2.

The C part of the C/Bh horizon has hue of 10YR, value of 5 or 6, and chroma of 4 through 8. The Bh part of the C/Bh horizon has hue of 7.5YR, value of 4, and chroma of 2 or 4; or it has hue of 10YR, value of 3 or 4, and chroma of 3.

The C horizon has hue of 10YR, value of 7 or 8, and chroma of 3 or 4 or value of 6 and chroma of 4. Some pedons have a C horizon that has hue of 10YR, value of 7, and chroma of 1 or 2.

Lakeland Series

The Lakeland series consists of excessively drained soils that formed in sandy deposits on uplands. Slope ranges from 1 to 8 percent.

Typical pedon of Lakeland sand, 1 to 8 percent slopes, in Hoke County, about 9 miles west of Raeford, 0.7 mile east of Five Points on State Road 1214, and 50 feet south of the road:

- Ap—0 to 6 inches; dark gray (10YR 4/1) sand; single grained; loose; few fine roots; medium acid; clear smooth boundary.
- C1—6 to 15 inches; yellowish brown (10YR 5/6) sand; single grained; loose; few fine roots; medium acid; gradual wavy boundary.
- C2—15 to 44 inches; strong brown (7.5YR 5/8) sand; single grained; loose; strongly acid; gradual wavy boundary.
- C3—44 to 52 inches; reddish yellow (7.5YR 6/8) sand; single grained; loose; strongly acid; gradual wavy boundary.
- C4—52 to 62 inches; brownish yellow (10YR 6/6) sand; single grained; loose; medium acid; gradual wavy boundary.
- C5—62 to 82 inches; yellow (10YR 7/6) sand; single grained; loose; medium acid.

Lakeland soils are sandy to a depth of more than 80 inches. The 10- to 40-inch control section contains 5 to 10 percent silt, plus clay. Reaction is strongly acid or medium acid, except where the surface has been limed.

The Ap or A horizon has hue of 10YR, value of 3 or 4, and chroma of 1 or 2.

The C horizon has hue of 10YR or 7.5YR, value of 5 or 6, and chroma of 6 through 8; or it has hue of 10YR, value of 7, and chroma of 4 through 6. Small pockets of gray or white sand are common below a depth of 40 inches in some pedons.

Lenoir Series

The Lenoir series consists of somewhat poorly drained soils that formed in stratified clayey sediment on uplands. Slope is less than 2 percent.

Typical pedon of Lenoir loam, in Cumberland County, approximately 10 miles northeast of Fayetteville, 0.1 mile west of the intersection of State Road 1700 and State Road 1609 along State Road 1609 and 200 feet south of the road:

- Oi—1 inch to 0; partially decomposed leaves and pine needles.
- A—0 to 3 inches; grayish brown (10YR 5/2) loam; weak fine granular structure; friable, slightly sticky; many fine and medium roots; very strongly acid; clear smooth boundary.
- BA—3 to 7 inches; yellowish brown (10YR 5/4) loam; common fine distinct light gray (10YR 7/2) mottles; weak medium subangular blocky structure; friable, slightly sticky; common medium roots; very strongly acid; gradual wavy boundary.
- Bt—7 to 16 inches; pale brown (10YR 6/3) silty clay loam; few fine distinct strong brown (7.5YR 5/6) and common fine distinct light gray (10YR 7/2) mottles; weak medium subangular blocky structure; firm, sticky; very strongly acid; gradual wavy boundary.
- Btg—16 to 38 inches; gray (10YR 6/1) silty clay; common medium prominent yellowish red (5YR 5/8) mottles; weak medium subangular blocky structure; firm, sticky; strongly acid; gradual wavy boundary.
- BCg—38 to 72 inches; gray (10YR 6/1) clay; many coarse distinct strong brown (7.5YR 5/6) mottles; weak medium subangular blocky structure; very firm, sticky; very strongly acid; gradual wavy boundary.

The loamy and clayey horizons are more than 60 inches deep to sediment of the Coastal Plain. Reaction is very strongly acid or strongly acid in all horizons, except where the surface has been limed.

The A or Ap horizon has hue of 10YR, value of 3 through 6, and chroma of 1 or 2; or it has hue of 2.5Y, value of 5 or 6, and chroma of 2.

The BA horizon, where present, has hue of 10YR, value of 6, and chroma of 3 through 6 or value of 5 and chroma of 4; or it has hue of 2.5Y, value of 5, and chroma of 4 or 6. It has few to common gray mottles. The BA horizon is loam, fine sandy loam, or clay loam. The Bt horizon has hue of 10YR, value of 5, and chroma of 4 or value of 6 and chroma of 3 through 6; or it has

hue of 2.5Y, value of 5, and chroma of 4 or 6. The Bt horizon has common to many gray mottles. The Btg horizon has hue of 10YR, value of 5, and chroma of 1 or value of 6 and chroma of 1 or 2. It is clay, clay loam, silty clay loam, or silty clay. The BCg horizon has hue of 10YR, value of 5 through 7, and chroma of 1 or value of 7 and chroma of 2. It is clay, sandy clay, clay loam, or sandy clay loam.

Leon Series

The Leon series consists of poorly drained soils that formed in sandy sediment in low flats and depressions on uplands. Slope is less than 2 percent.

Typical pedon of Leon sand, in Cumberland County, approximately 14 miles southeast of Fayetteville, 0.1 mile northeast of the intersection of State Road 1002 and State Road 2042 along State Road 2042, and 150 feet south of the road:

- Oi—1 inch to 0; partially decomposed leaves, twigs, and pine needles.
- A—0 to 5 inches; very dark gray (10YR 3/1) sand; single grained; loose; many fine and medium roots; many clean sand grains give a salt and pepper appearance; very strongly acid; clear smooth boundary.
- E—5 to 19 inches; gray (10YR 6/1) sand; single grained; loose; common fine and medium roots; very strongly acid; abrupt smooth boundary.
- Bh1—19 to 28 inches; black (10YR 2/1) sand; massive structure parting to weak fine granular; very friable; strongly acid; gradual wavy boundary.
- Bh2—28 to 42 inches; dark brown (7.5YR 3/2) sand; weak fine granular structure; very friable; strongly acid; gradual wavy boundary.
- BC—42 to 48 inches; dark yellowish brown (10YR 4/4) sand; single grained; loose; strongly acid; gradual wavy boundary.
- C—48 to 80 inches; pale brown (10YR 6/3) sand; single grained; loose; very strongly acid.

Leon soils are sandy to a depth of 80 inches or more. Reaction is extremely acid through strongly acid in all horizons.

The Ap or A horizon has hue of 10YR, value of 2 through 4, and chroma of 1. When dry, this horizon has a salt and pepper appearance, which is caused by the mixture of organic matter and white sand grains. The E horizon has hue of 10YR, value of 5 through 7, and chroma of 1 or 2.

The Bh horizon has hue of 10YR, value of 2, and chroma of 1 or 2 or value and chroma of 3; hue of 5YR, value of 2, and chroma of 1 or 2 or value of 3 and chroma of 2 through 4; or hue of 7.5YR, value of 3, and chroma of 2. The BC horizon, where present, has hue of

10YR, value of 4 or 5, and chroma of 3 or value and chroma of 4.

The C horizon has hue of 10YR. It has value of 7 or 8 and chroma of 3 or 4; value of 7 and chroma of 1 or 2; or value of 6 and chroma of 1 or 3.

Lynchburg Series

The Lynchburg series consists of somewhat poorly drained soils that formed in loamy sediment on uplands. Slope is less than 2 percent.

Typical pedon of Lynchburg sandy loam, in Cumberland County, approximately 6.5 miles south of Fayetteville along U.S. Highway 301, 0.5 mile southwest of U.S. Highway 301 on State Road 1121, 0.3 mile southwest on a farm road, and 100 feet south of the road:

- Ap—0 to 6 inches; dark gray (10YR 4/1) sandy loam; weak medium granular structure; very friable; few fine roots; slightly acid; abrupt smooth boundary.
- BA—6 to 10 inches; light yellowish brown (2.5Y 6/4) sandy loam; few medium distinct gray (10YR 6/1) mottles; weak fine subangular blocky structure; friable; few fine roots; very strongly acid; gradual wavy boundary.
- Bt—10 to 20 inches; light yellowish brown (2.5Y 6/4) sandy clay loam; common medium distinct gray (10YR 6/1) mottles; weak fine subangular blocky structure; friable; few fine roots; very strongly acid; gradual wavy boundary.
- Btg1—20 to 42 inches; gray (10YR 6/1) sandy clay loam; common medium distinct light yellowish brown (2.5Y 6/4), few medium distinct brown (7.5YR 5/4), and common medium distinct brownish yellow (10YR 6/8) mottles; weak fine subangular blocky structure; friable; very strongly acid; gradual wavy boundary.
- Btg2—42 to 61 inches; gray (10YR 6/1) sandy clay loam; few fine distinct brownish yellow (10YR 6/8) mottles; weak fine subangular blocky structure; friable; very strongly acid; gradual wavy boundary.
- BCg—61 to 72 inches; light brownish gray (10YR 6/2) sandy loam; weak fine subangular blocky structure; friable; very strongly acid.

The loamy horizon is more than 60 inches deep to stratified sediment of the Coastal Plain. Reaction ranges from extremely acid through strongly acid in all horizons, except where the surface has been limed.

The Ap or A horizon has hue of 10YR or 2.5Y, value of 2 through 4, and chroma of 1 or 2. The E horizon, where present, has hue of 10YR or 2.5Y, value of 5 through 7, and chroma of 2 through 4.

The BA horizon, where present, has hue of 10YR or 2.5Y, value of 5 or 6, and chroma of 3 through 6. It has few to many gray mottles. The BA horizon is sandy loam or fine sandy loam. The upper part of the Bt horizon has

hue of 10YR or 2.5Y, value of 5 or 6, and chroma of 3 through 6 and many gray mottles. The lower part of the Bt horizon has hue of 10YR or 2.5Y, value of 4 through 7, and chroma of 1 or 2. The Bt horizon typically is sandy clay loam but ranges to clay loam or sandy loam. The BCg horizon, where present, is similar in color and texture to the lower part of the Bt horizon. The BCg horizon typically contains less clay than the horizon above it.

Lynn Haven Series

The Lynn Haven series consists of poorly drained soils that formed in sandy sediment on uplands. Slope is less than 2 percent.

Typical pedon of Lynn Haven sand in an area of Torhunta and Lynn Haven soils, in Cumberland County, is approximately 15 miles southeast of Fayetteville, 0.6 mile south of the intersection of N.C. Highway 53 and State Road 2228 along N.C. Highway 53, and 0.3 mile northeast of the road:

- Oi—1 inch to 0; layer of partially decomposed organic matter.
- A—0 to 10 inches; black (10YR 2/1) sand; weak fine granular structure; very friable; high in organic matter; many fine and medium roots; strongly acid; clear wavy boundary.
- E—10 to 15 inches; gray (10YR 6/1) sand; single grained; loose; common fine and medium roots; strongly acid; clear wavy boundary.
- Bh1—15 to 20 inches; very dark brown (10YR 2/2) sand; weak fine granular structure; friable; weakly cemented; few fine and medium roots; sand grains coated with organic matter; strongly acid; gradual wavy boundary.
- Bh2—20 to 34 inches; black (10YR 2/1) sand; weak fine granular structure; friable; few fine and medium roots; sand grains coated or stained with organic matter; very strongly acid; gradual wavy boundary.
- Bh3—34 to 56 inches; very dark brown (10YR 2/2) sand; single grained; loose; sand grains stained with organic matter; very strongly acid; clear wavy boundary.
- Cg—56 to 80 inches; dark grayish brown (10YR 4/2) sand; single grained; loose; extremely acid.

Lynn Haven soils are sandy to a depth of 80 inches or more. Reaction ranges from extremely acid through strongly acid in all horizons.

The Ap or A horizon has hue of 10YR, value of 2 or 3, and chroma of 1. When dry, this horizon has a salt and pepper appearance, which is caused by the mixing of organic matter and white sand grains. The E horizon has hue of 10YR, value of 5 through 7, and chroma of 1 or 2.

The Bh horizon has hue of 5YR or 10YR, value of 2, and chroma of 1 or 2; or it has hue of 7.5YR, value of 3,

and chroma of 2. Sand grains are coated with organic matter.

The Cg horizon has hue of 10YR. It has value of 4 and chroma of 2; value of 5 and chroma of 1; or it has value of 6 or 7 and chroma of 1 or 2.

McColl Series

The McColl series consists of poorly drained soils that formed in loamy and clayey sediment on uplands. Slope is less than 1 percent.

Typical pedon of McColl loam, in Hoke County, approximately 8 miles south of Raeford, 0.1 mile east of the intersection of State Road 1130 and State Road 1113 along State Road 1113 and 60 feet south of the road:

- Ap—0 to 7 inches; very dark gray (10YR 3/1) loam; weak fine granular structure; friable; slightly acid; abrupt smooth boundary.
- Btg—7 to 17 inches; light brownish gray (10YR 6/2) clay; few medium distinct brownish yellow (10YR 6/6) mottles; moderate medium subangular blocky structure; friable, slightly sticky; few thin distinct continuous clay films; strongly acid; gradual wavy boundary.
- Btx1—17 to 26 inches; yellowish brown (10YR 5/8) sandy clay loam; few medium prominent red (2.5YR 4/8) mottles; moderate coarse prismatic structure that parts to moderate medium platy; compact and hard in place, brittle; few thin distinct continuous clay films; strongly acid; gradual wavy boundary.
- Btx2—26 to 43 inches; strong brown (7.5YR 5/8) sandy clay loam; common coarse distinct light brownish gray (10YR 6/2) mottles; moderate coarse columnar structure that parts to moderate thin platy; compact and hard in place, brittle; common fine continuous pores; few thin distinct continuous clay films; strongly acid; gradual wavy boundary.
- BCg—43 to 51 inches; gray (10YR 6/1) sandy clay loam; few fine distinct yellowish brown (10YR 5/6) mottles; weak fine subangular blocky structure; friable, slightly sticky; strongly acid; gradual wavy boundary.
- Cg—51 to 72 inches; gray (10YR 6/1) sandy loam and pockets of sandy clay; few medium prominent red (10R 4/8) and few medium distinct brownish yellow (10YR 6/6) mottles; massive; very friable; strongly acid.

The loamy and clayey horizons are 40 inches to more than 80 inches deep to stratified sediment of the Coastal Plain. Reaction is strongly acid or very strongly acid throughout, except where the surface has been limed.

The Ap or A horizon has hue of 10YR, value of 3 or 4, and chroma of 1 or 2.

The BAg horizon, where present, has hue of 10YR, value of 5 through 7, and chroma of 1 or 2 or value of 4 and chroma of 2. It is sandy clay loam or clay loam. The

Btg horizon is similar in color to the BAg horizon. It is clay or sandy clay. The Btx horizon has hue of 7.5YR or 10YR, value of 5 through 7, and chroma of 4 through 8. It is sandy clay or sandy clay loam that has columnar, platy, or angular blocky structure. The Btx horizon ranges in depth from 12 to 36 inches. In some pedons, tongues of the Btg horizon extend into it. The BCg horizon has hue of 10YR, value of 5 through 7, and chroma of 1 or 2. It is clay, sandy clay, or sandy clay loam.

The Cg horizon is similar in color to the BCg horizon. It is sandy loam, sandy clay loam, or sandy clay.

Nahunta Series

The Nahunta series consists of somewhat poorly drained soils that formed in loamy and silty sediment on uplands.

Typical pedon of Nahunta loam, in Cumberland County, about 1 mile east of Wade, 0.5 mile south of the intersection of U.S. Highway 301 and State Road 1856 along State Road 1856, and 0.2 mile northwest of the road:

- Oi—2 inches to 0; undecomposed pine needles and leaves.
- A—0 to 4 inches; very dark gray (10YR 3/1) loam; moderate fine granular structure; friable; many fine, common medium, and few coarse roots; very strongly acid; clear smooth boundary.
- AB—4 to 7 inches; brownish yellow (10YR 6/6) loam; common fine distinct light brownish gray (10YR 6/2) mottles; moderate fine subangular blocky structure; friable; common medium roots; very strongly acid; gradual wavy boundary.
- Bt—7 to 25 inches; brownish yellow (10YR 6/6) clay loam; common medium distinct light brownish gray (10YR 6/2) mottles; moderate medium subangular blocky structure; friable; few fine roots; very strongly acid; gradual wavy boundary.
- Btg—25 to 55 inches; gray (10YR 6/1) clay loam; common coarse prominent yellowish red (5YR 4/8) mottles; weak fine subangular blocky structure; firm; very strongly acid; gradual wavy boundary.
- BCg—55 to 72 inches; mottled light gray (N 7/0) and yellow (10YR 7/8) clay; weak medium subangular blocky structure; very firm; very strongly acid.

The loamy and silty horizons are 60 inches to more than 80 inches deep to stratified sediment of the Coastal Plain. Reaction is very strongly acid or strongly acid, except where the surface has been limed.

The Ap or A horizon has hue of 10YR, value of 2 to 4, and chroma of 1. The E horizon, where present, has hue of 2.5Y, value of 7, and chroma of 4 or value of 6 and chroma of 2 or 3.

The AB horizon, where present, has hue of 10YR or 2.5Y, value of 5 or 6, and chroma of 4 through 6. It has

few to many gray mottles. It is clay loam or loam. The upper part of the Bt horizon is similar in color to the AB horizon. The lower part has hue of 10YR, value of 6 or 7, and chroma of 1 or value of 7 and chroma of 2. Hue may be neutral, value may be 6 or 7, and chroma may be 0. The Bt horizon is clay loam, loam, or silty clay loam. The BCg horizon, where present, is similar in color to the lower part of the Bt horizon. It is clay, clay loam, or loam.

Norfolk Series

The Norfolk series consists of well drained soils that formed in loamy sediment on uplands. Slope ranges from 0 to 6 percent.

Typical pedon of Norfolk loamy sand, 0 to 2 percent slopes, in Cumberland County, approximately 4 miles west of Fayetteville, 0.3 mile west of the intersection of N.C. Highway 401 and State Road 1105 along Highway 401, approximately 700 feet north of the road:

- Ap—0 to 8 inches; brown (10YR 5/3) loamy sand; weak fine granular structure; very friable; slightly acid; abrupt smooth boundary.
- E—8 to 12 inches; light yellowish brown (2.5Y 6/4) loamy sand; weak fine granular structure; very friable; slightly acid; clear wavy boundary.
- Bt1—12 to 32 inches; yellowish brown (10YR 5/8) sandy clay loam; weak fine and medium subangular blocky structure; friable; few fine discontinuous pores; few thin clay films on faces of peds; medium acid; gradual wavy boundary.
- Bt2—32 to 52 inches; yellowish brown (10YR 5/8) sandy clay loam; few medium prominent red (2.5YR 4/6) mottles; moderate medium subangular blocky structure; friable; few fine discontinuous pores; few thin clay films on faces of peds; strongly acid; gradual wavy boundary.
- Bt3—52 to 66 inches; yellowish brown (10YR 5/6) sandy clay loam; common coarse prominent red (2.5YR 4/6) and few fine distinct pale brown (10YR 6/3) mottles; weak medium subangular blocky structure; friable; few fine discontinuous pores; few thin clay films on faces of peds; strongly acid; gradual wavy boundary.
- BC—66 to 72 inches; mottled brownish yellow (10YR 6/8), red (2.5YR 5/6), and pale brown (10YR 6/3) sandy clay loam, weak fine subangular blocky structure; friable; strongly acid; gradual wavy boundary.

The sandy and loamy horizons are 60 inches to more than 100 inches deep to stratified sediment of the Coastal Plain. Reaction is strongly acid or medium acid, except where the surface has been limed.

The Ap or A horizon has hue of 10YR, value of 3 through 5, and chroma of 2 or 3. Where present, the E

horizon has hue of 10YR, value of 6 or 7, and chroma of 3; or it has hue of 2.5Y, value of 6, and chroma of 4.

The BE horizon, where present, has hue of 10YR, value of 5, and chroma of 4 through 8. It is sandy loam or sandy clay loam. The Bt horizon has hue of 10YR, value of 5 or 6, and chroma of 6 through 8; or it has hue of 7.5YR, value of 5, and chroma of 6 or 8. It is sandy clay loam or clay loam. The BC horizon has matrix colors similar to the Bt horizon and commonly is mottled with strong brown and red. Gray mottles are few to common below a depth of 30 inches. The BC horizon is sandy clay loam or sandy loam.

Pactolus Series

The Pactolus series consists of moderately well drained to somewhat poorly drained soils that formed in sandy sediment on uplands. Slope is less than 2 percent.

Typical pedon of Pactolus loamy sand, in Cumberland County, is about 5 miles south of Cedar Creek, 0.3 mile northwest of the intersection of State Road 2042 and State Road 1002 along State Road 1002, and 100 feet north of the road:

- Ap—0 to 9 inches; dark grayish brown (10YR 4/2) loamy sand; weak medium granular structure; very friable; common medium roots; slightly acid; clear smooth boundary.
- C1—9 to 26 inches; light yellowish brown (10YR 6/4) loamy sand; common coarse distinct very pale brown (10YR 7/3) and few fine faint yellowish brown mottles; weak medium granular structure; very friable; few medium roots; few medium pockets of coarse sand and few medium old root channels; medium acid; gradual wavy boundary.
- C2—26 to 36 inches; very pale brown (10YR 7/3) sand; few coarse distinct yellow (10YR 7/6) and few medium distinct light gray (10YR 7/2) mottles; single grained; loose; few medium pockets of coarse sand and few medium old root channels; slightly acid; gradual wavy boundary.
- C3—36 to 58 inches; yellow (10YR 7/6) loamy sand; few medium distinct strong brown (7.5YR 5/8) and few medium distinct light gray (10YR 7/2) mottles; weak medium granular structure; very friable; few medium pockets of coarse sand and few medium old root channels; strongly acid; gradual wavy boundary.
- C4—58 to 82 inches; very pale brown (10YR 7/4) sand; few medium distinct white (10YR 8/1) and few fine faint strong brown mottles; single grained; loose; strongly acid.

Pactolus soils are sandy to a depth of 80 inches or more. Reaction is very strongly acid or strongly acid, except where the surface has been limed.

The Ap or A horizon has hue of 10YR, value of 3 through 5, and chroma of 1 or 2.

The C horizon to a depth of about 25 inches has hue of 10YR, value of 6 or 7, and chroma of 3 through 6 or value of 5 and chroma of 4 through 6. The lower part of the C horizon has hue of 10YR, value of 6 or 7, and chroma of 1 through 4, or value of 5 and chroma of 1. Gray mottles are at a depth of 20 to 40 inches.

Pantego Series

The Pantego series consists of very poorly drained soils that formed in loamy sediment on uplands. Slope is less than 2 percent.

Typical pedon of Pantego loam, in Cumberland County, about 4 miles west of Fayetteville, 0.5 mile south of the intersection of Cliffdale Road and State Road 1403 along State Road 1403, and 100 feet west of the road:

Ap—0 to 11 inches; very dark gray (10YR 3/1) loam; moderate fine granular structure; very friable; slightly acid; gradual wavy boundary.

A—11 to 19 inches; very dark gray (10YR 3/1) loam; weak fine granular structure; friable; very strongly acid; gradual wavy boundary.

BAg—19 to 23 inches; grayish brown (10YR 5/2) sandy clay loam; weak fine subangular blocky structure; friable; extremely acid; gradual wavy boundary.

Btg1—23 to 30 inches; gray (10YR 5/1) clay loam; weak fine subangular blocky structure; friable, slightly sticky; few thin clay films on faces of peds; extremely acid; gradual wavy boundary.

Btg2—30 to 58 inches; gray (10YR 5/1) sandy clay loam; weak fine subangular blocky structure; friable, slightly sticky; few thin clay films on faces of peds; extremely acid; gradual wavy boundary.

Btg3—58 to 72 inches; light brownish gray (10YR 6/2) sandy clay; common medium distinct strong brown (7.5YR 5/8) mottles; weak medium subangular blocky structure; firm, slightly sticky; extremely acid.

The loamy and clayey horizons are more than 60 inches deep to stratified sediment of the Coastal Plain. Reaction is extremely acid or very strongly acid, except where the surface has been limed.

The Ap or A horizon has hue of 10YR, value of 2 or 3, and chroma of 1.

The BAg horizon, where present, has hue of 10YR, value of 4 or 5, and chroma of 1 or 2. The Btg horizon has hue of 10YR, value of 5 or 6, and chroma of 1 or 2. It has few to common red and brown mottles. The BCg horizon, if present, is similar in color to the Btg horizon. The Btg horizons are sandy clay loam, clay loam, or sandy clay.

Rains Series

The Rains series consists of poorly drained soils that formed in loamy sediment on uplands. Slope is less than 2 percent.

Typical pedon of Rains sandy loam, in Cumberland County, is about 2 miles southwest of Hope Mills, 0.8 mile northwest of the intersection of U.S. Highway 301 and State Road 1121 along State Road 1121, and 0.25 mile northeast of the road, in a Carolina bay:

Ap—0 to 5 inches; very dark gray (10YR 3/1) sandy loam; weak fine granular structure; very friable; common fine and medium roots; slightly acid; abrupt smooth boundary.

ABg—5 to 9 inches; gray (10YR 5/1) sandy loam; weak fine subangular blocky structure; friable; few fine roots; strongly acid; clear wavy boundary.

Btg1—9 to 26 inches; gray (10YR 6/1) sandy clay loam; few fine faint brownish yellow (10YR 6/6), common medium distinct strong brown (7.5YR 5/8), and few medium prominent red (2.5YR 4/8) mottles; weak fine subangular blocky structure; friable; few medium roots; very strongly acid; gradual wavy boundary.

Btg2—26 to 46 inches; gray (10YR 6/1) sandy clay loam; common coarse prominent strong brown (7.5YR 5/8), few medium prominent red (2.5YR 4/8), common medium distinct brownish yellow (10YR 6/6) mottles; weak fine subangular blocky structure; friable; very strongly acid; gradual wavy boundary.

Btg3—46 to 54 inches; gray (10YR 6/1) sandy clay loam; few medium prominent red (2.5YR 4/8) and brownish yellow (10YR 6/6) mottles; weak fine subangular blocky structure; friable; very strongly acid; gradual wavy boundary.

Btg4—54 to 63 inches; gray (10YR 6/1) sandy clay loam; weak fine subangular blocky structure; friable; very strongly acid; gradual wavy boundary.

BCg—63 to 72 inches; gray (10YR 6/1) sandy loam; weak medium subangular blocky structure; very friable; very strongly acid.

The loamy horizon is 60 inches to more than 100 inches deep to stratified sediment of the Coastal Plain. Reaction is very strongly acid or strongly acid, except where the surface has been limed.

The Ap or A horizon has hue of 10YR or 2.5Y, value of 2 through 4, and chroma of 1 or 2. The E horizon, where present, has hue of 10YR or 2.5Y, value of 4 through 6, and chroma of 1 or 2.

The ABg horizon, where present, has hue of 10YR, value of 5 through 7, and chroma of 1 or 2. It is sandy loam or fine sandy loam. The Btg horizon has matrix colors similar to the ABg horizon but contains few to many high chroma mottles. It is sandy clay loam or clay loam. The BCg horizon has hue of 10YR, value of 4

through 7, and chroma of 1 and few to many mottles that have high chroma. It is sandy clay loam or sandy loam.

The BCg horizon has hue of 10YR, value of 5 through 7, and chroma of 1. It is variable in texture, which ranges from loamy sand to sandy clay.

Roanoke Series

The Roanoke series consists of poorly drained soils that formed in stratified clayey sediment on terraces of the Cape Fear River and its major tributaries. These soils are in Cumberland County. Slope is less than 2 percent.

Typical pedon of Roanoke loam, in Cumberland County, is about 6 miles north of Fayetteville, 0.4 mile east of the intersection of State Road 1714 and State Road 1720 along State Road 1720, and 100 feet north of the road:

- Ap—0 to 8 inches; grayish brown (10YR 5/2) loam; weak medium granular structure; friable; few fine roots; neutral; clear smooth boundary.
- B_{Ag}—8 to 12 inches; light brownish gray (10YR 6/2) clay loam: common medium distinct streaks of strong brown (7.5YR 5/8); weak medium subangular blocky structure; friable; few fine roots; common fine flakes of mica; some Ap material mixed into this horizon; common fine and medium pores; strongly acid; gradual wavy boundary.
- B_{tg1}—12 to 30 inches; gray (10YR 6/1) and dark gray (10YR 4/1) clay; common medium prominent yellowish red (5YR 5/8) mottles and common medium distinct yellowish brown (10YR 5/8) streaks; weak coarse prismatic structure; firm, sticky, plastic; few fine roots; common fine flakes of mica; few fine pockets of sandy loam and clay loam; very strongly acid; gradual wavy boundary.
- B_{tg2}—30 to 48 inches; gray (10YR 6/1) clay; common medium prominent yellowish red (5YR 5/8) and yellowish brown (10YR 5/8) mottles; weak coarse prismatic structure; firm, sticky, plastic; few fine roots; common fine flakes of mica; few fine pockets of sandy loam and clay loam; very strongly acid; gradual wavy boundary.
- BC_g—48 to 55 inches; gray (10YR 6/1) clay loam; common medium prominent yellowish red (5YR 5/8) mottles; weak medium subangular blocky structure; friable, sticky, plastic; few fine and medium pockets of clay loam and sandy loam; very strongly acid; gradual wavy boundary.
- 2C_g—55 to 80 inches; gray (10YR 6/1) loamy sand; few fine streaks of strong brown (7.5YR 5/8); massive; very friable; common fine flakes of mica; few fine and medium pockets of sandy clay loam and sand; few fine pebbles; very strongly acid.

The loamy and clayey horizons are 40 to 60 inches deep to stratified sediment deposited by the river.

Reaction is very strongly acid or strongly acid in all horizons, except where the surface has been limed. Mica flakes are few to common throughout the B_{2tg} and C horizons.

The A horizon has hue of 10YR or 2.5Y, value of 2 through 4, and chroma of 1 or 2. The Ap horizon has hue of 10YR or 2.5Y, value of 4 through 6, and chroma of 1 or 2. The E horizon has hue of 10YR or 2.5Y, value of 5 or 6, and chroma of 1 or 2.

In 60 percent of the volume, between the base of the A or Ap horizon and 30 inches, hue is 10YR, 2.5Y, or 5Y. When the soil is moist, value is more than 5 and chroma is 2 or less, or value is 5 or less and chroma is less than 2. The B_{tg} horizon is clay, silty clay, silty clay loam, or clay loam that is more than 30 percent silt. When wet, the lower part of the B_{tg} horizon is very sticky. The BC_g horizon is similar in color to the B_{tg} horizon, but it is less clayey. The BC_g horizon may contain few to many quartz pebbles in some pedons.

The 2C_g horizon typically is gray or light gray but may be similar in color to the B_{tg} horizon. It typically is stratified and ranges from sand through clay. It contains many quartz pebbles. In some places the 2C_g horizon is massive gray clay.

Stallings Series

The Stallings series consists of somewhat poorly drained soils that formed in loamy sediment on uplands. Slope is less than 2 percent.

Typical pedon of Stallings loamy sand, in Cumberland County, about 3 miles southeast of Vander, 0.85 mile southeast of the intersection of State Road 1842 and N.C. Highway 24 along N.C. Highway 24, and 800 feet south of the road:

- Ap—0 to 10 inches; dark gray (10YR 4/1) loamy sand; weak medium granular structure; very friable; few fine roots; medium acid; abrupt smooth boundary.
- B_t—10 to 27 inches; pale brown (10YR 6/3) sandy loam; common coarse distinct gray (10YR 6/1), and few medium distinct brownish yellow (10YR 6/6) mottles; weak fine subangular blocky structure; friable; strongly acid; gradual wavy boundary.
- B_{tg}—27 to 44 inches; light gray (10YR 7/1) sandy loam; few fine faint brownish yellow mottles; weak fine granular structure; very friable; very strongly acid; gradual wavy boundary.
- BC_g—44 to 64 inches; light brownish gray (10YR 6/2) loamy sand; common medium distinct brownish yellow (10YR 6/8) mottles; weak fine granular structure; very friable; very strongly acid; gradual wavy boundary.
- C—64 to 72 inches; very pale brown (10YR 7/3) and light gray (10YR 7/1) loamy sand; single grained; loose; very strongly acid.

The sandy and loamy horizons are more than 60 inches deep to sediment of the Coastal Plain. Reaction ranges from extremely acid through strongly acid in all horizons except where the surface has been limed.

The Ap or A horizon has hue of 10YR or 5Y, value of 4 or 5, and chroma of 1 or 2; or it has hue of 2.5Y, value of 4 or 5, and chroma of 2. The E horizon has hue of 10YR, value of 6 through 8, and chroma of 3 or 4 or value of 6 and chroma of 2.

The Bt horizon has hue of 10YR, value of 6 or 7, and chroma of 3 through 8; or it has hue of 2.5Y, value of 6 or 7, and chroma of 4 through 8. Gray mottles are common in the Bt horizon. The Btg horizon has hue of 10YR, value of 5 through 7, and chroma of 1 or 2, or it has hue of 2.5Y, value of 5 through 7, and chroma of 2. Mottles of strong brown, yellowish brown, light yellowish brown, and light olive brown are common in the Btg horizon. The Bt and Btg horizons are sandy loam or fine sandy loam. The BCg horizon is similar in color to the Btg horizon. It is loamy sand, loamy fine sand, sandy loam, or fine sandy loam.

The C horizon has hue of 10YR, value of 5 to 7, and chroma of 1 to 3; or it has hue of 2.5Y, value of 5 to 7, and chroma of 2.

Tarboro Series

The Tarboro series consists of somewhat excessively drained soils that formed in sandy sediment on terraces of the Cape Fear River, Lower Little River, and Rockfish Creek. These soils are in Cumberland County. Slope ranges from 0 to 6 percent.

Typical pedon of Tarboro loamy sand, 0 to 6 percent slopes, in Cumberland County, about 2.5 miles northwest of Wade, 1,000 feet east of the intersection of State Road 1708 and State Road 1609 along State Road 1708, and 100 feet south of the road:

- Ap—0 to 10 inches; dark brown (10YR 4/3) loamy sand; single grained; loose; strongly acid; abrupt smooth boundary.
- C1—10 to 35 inches; strong brown (7.5YR 5/6) sand; single grained; loose; strongly acid; gradual wavy boundary.
- C2—35 to 58 inches; brownish yellow (10YR 6/6) sand; single grained; loose; common fine flakes of mica; strongly acid; gradual wavy boundary.
- C3—58 to 82 inches; yellow (10YR 7/6) sand; single grained; loose; common fine flakes of mica; strongly acid.

Tarboro soils are sandy to a depth of more than 80 inches. Reaction ranges from strongly acid through slightly acid in all horizons, except where the surface has been limed.

The Ap or A horizon has hue of 10YR, value of 4, and chroma of 2 or 3; or it has hue of 7.5YR, value of 3 or 4, and chroma of 2.

The C horizon has hue of 7.5YR or 10YR, value of 5 through 7, and chroma of 6 through 8; or it has hue of 5YR or 7.5YR and value and chroma of 4. Gravelly layers are below a depth of 40 inches in the C horizon of some pedons.

Torhunta Series

The Torhunta series consists of very poorly drained soils that formed in loamy sediment on uplands. Slope is less than 2 percent.

Typical pedon of Torhunta fine sandy loam in an area of Torhunta and Lynn Haven soils, in Cumberland County, about 18 miles southeast of Fayetteville, 0.6 mile southwest of the intersection of N.C. Highway 210 and N.C. Highway 242 along N.C. Highway 242, 1 mile northwest on a timber company road, and 600 feet north of the road:

- A—0 to 7 inches; black (10YR 2/1) fine sandy loam; weak fine granular structure; friable; many fine and common medium roots; very strongly acid; gradual wavy boundary.
- E—7 to 14 inches; very dark gray (10YR 3/1) fine sandy loam; weak fine granular structure; friable; many fine roots; very strongly acid; gradual wavy boundary.
- BEg—14 to 22 inches; dark gray (10YR 4/1) fine sandy loam; weak fine subangular blocky structure; friable; common organic stains from decayed roots; strongly acid; gradual wavy boundary.
- Bg—22 to 34 inches; dark gray (10YR 4/1) fine sandy loam; common coarse distinct light yellowish brown (2.5Y 6/4) mottles; weak fine subangular blocky structure; friable; common organic stains from decayed roots; strongly acid; gradual wavy boundary.
- BCg—34 to 46 inches; gray (10YR 6/1) fine sandy loam; few medium distinct light yellowish brown (2.5Y 6/4) mottles; weak fine subangular blocky structure; friable; strongly acid; gradual wavy boundary.
- Cg—46 to 72 inches; gray (10YR 6/1) loamy sand; massive; very friable; very strongly acid.

The loamy and sandy horizons are 20 to 50 inches deep to stratified sediment of the Coastal Plain. Reaction is very strongly acid or strongly acid throughout.

The A horizon has hue of 10YR, value of 2 or 3, and chroma of 1; or it has a neutral hue, value of 2, and chroma of 0. It is loam, sandy loam, or loamy sand.

The BEg, Bg, and BCg horizons have hue of 10YR, value of 4 or 5, and chroma of 1 or 2 or value of 6 and chroma of 1. They are sandy loam or fine sandy loam.

The Cg horizon is similar in color to the Bg horizon. It is sand, loamy sand, or sandy loam.

Vaucluse Series

The Vaucluse series consists of well drained soils that formed in loamy sediment on uplands. Slope ranges from 2 to 25 percent.

Typical pedon of Vaucluse loamy sand, 8 to 15 percent slopes, in Cumberland County, about 5 miles north of Fayetteville, 1 mile west of the intersection of U.S. Highway 401 and State Road 1611 along State Road 1611 to Pine Forest High School, and 1,100 feet south of the road:

- A—0 to 4 inches; dark grayish brown (10YR 4/2) loamy sand; weak fine granular structure; very friable; common fine and few medium roots; few fine quartz grains; medium acid; clear smooth boundary.
- E—4 to 9 inches; yellowish brown (10YR 5/4) loamy sand; weak fine granular structure; very friable; common fine and few medium roots; few fine quartz grains; some material from A horizon intermixed; few fine and medium ironstones; medium acid; clear wavy boundary.
- Bt1—9 to 25 inches; yellowish red (5YR 5/6) sandy clay loam; few fine faint yellowish brown mottles occur in vertical irregular tongues; moderate medium subangular blocky structure; friable, slightly sticky; discontinuous clay films on faces of peds; very strongly acid; gradual wavy boundary.
- Bt2—25 to 37 inches; yellowish red (5YR 5/8) sandy clay loam; few medium distinct red (2.5YR 4/8) mottles and coarse vertical irregular tongues of yellowish brown (10YR 5/8); moderate medium subangular blocky structure and angular blocky structure; brittle and compact; slightly sticky; discontinuous clay films on faces of peds; very strongly acid; gradual wavy boundary.
- Bt3—37 to 50 inches; red (2.5YR 4/8) sandy clay loam; few pockets of clay; common medium distinct reddish yellow (7.5YR 6/8) and gray (10YR 6/1) mottles; moderate medium subangular blocky structure; slightly brittle and compact, slightly sticky; few fine flakes of mica; few fine fragments of feldspar; many fine, medium, and coarse ironstones; very strongly acid; gradual wavy boundary.
- BC—50 to 60 inches; yellowish red (5YR 5/8) sandy clay loam; few pockets of light gray (10YR 7/1) clay; common medium distinct strong brown (7.5YR 5/8) mottles; weak medium subangular blocky structure; friable; few fine flakes of mica; very strongly acid; gradual wavy boundary.
- C—60 to 73 inches; reddish yellow (5YR 7/8) sandy loam; common medium distinct strong brown (7.5YR 5/8) and light gray (10YR 7/1) mottles; massive; very friable; few fine flakes of mica; very strongly acid.

The sandy and loamy horizons are 40 inches to more than 72 inches deep to stratified sediment of the Coastal

Plain. Reaction is extremely acid through strongly acid in all horizons, except where the surface has been limed.

The Ap or A horizon has hue of 10YR or 2.5Y, value of 3 through 5, and chroma of 2 or 3. The E horizon has hue of 10YR, value of 5 or 6, and chroma of 3 through 8.

The EB horizon, where present, has hue of 7.5YR or 10YR, value of 5, and chroma of 6 or 8. It is loamy sand or sandy loam. The Bt horizon has hue of 2.5YR through 10YR, value of 5, and chroma of 6 through 8; or it has hue of 2.5YR or 5YR, value of 4, and chroma of 6 through 8. The Bt horizon can be coarsely mottled with some or all of these colors. The Bt horizon is sandy clay loam. The BC horizon is similar in color to the Bt horizon. It is sandy loam, sandy clay loam, or loamy sand.

The C horizon is stratified sand and clay. It contains variable amounts of gravel. The C horizon has highly variable colors, ranging from red to gray and commonly is mottled with many contrasting colors.

Wagram Series

The Wagram series consists of well drained soils that formed in loamy sediment on uplands. Slope ranges from 0 to 8 percent.

Typical pedon of Wagram loamy sand, 0 to 6 percent slopes, in Cumberland County, about 3 miles southeast of Hope Mills, 1 mile east of Interstate 95 on State Road 2252, 0.7 mile northeast on a field road, 200 feet south of the field road:

- Ap—0 to 8 inches; grayish brown (10YR 5/2) loamy sand; single grained; loose; common fine and medium roots; slightly acid; abrupt smooth boundary.
- E—8 to 25 inches; pale brown (10YR 6/3) loamy sand; common medium faint yellowish brown (10YR 5/4) mottles; single grained; loose; few fine and medium roots; slightly acid; clear smooth boundary.
- Bt1—25 to 41 inches; yellowish brown (10YR 5/8) sandy clay loam; weak fine and medium subangular blocky structure; friable; few medium roots; medium acid; gradual wavy boundary.
- Bt2—41 to 55 inches; yellowish brown (10YR 5/8) sandy clay loam; common medium prominent red (2.5YR 4/6) and common medium distinct strong brown (7.5YR 5/6) mottles; weak medium and coarse subangular blocky structure; friable; thin clay films on faces of some peds; about 3 percent soft plinthite; strongly acid; gradual wavy boundary.
- Bt3—55 to 72 inches; yellowish brown (10YR 5/6) sandy clay loam; common medium distinct red (2.5YR 4/6), few medium distinct light brownish gray (10YR 6/2), and common medium faint light yellowish brown (10YR 6/4) mottles; weak medium subangular blocky structure; friable; about 3 percent soft plinthite; strongly acid.

The sandy surface layer is 20 to 40 inches thick over the loamy subsoil. Reaction is very strongly acid or strongly acid, except where the surface has been limed.

The Ap or A horizon has hue of 10YR, value of 4 or 5, and chroma of 1 or 2 or value of 6 and chroma of 1. The E horizon has hue of 10YR, value of 6 or 7, and chroma of 3 or 4; or it has hue of 2.5Y, value of 6 or 7, and chroma of 4.

The Bt horizon has hue of 10YR, value of 5 or 6, and chroma of 6 through 8; or it has hue of 7.5YR, value of 5, and chroma of 6 through 8. It has red, brown, and gray mottles in the lower part. The Bt horizon is sandy clay loam or sandy loam.

Wahee Series

The Wahee series consists of somewhat poorly drained soils that formed in clayey fluvial sediment on terraces of Cape Fear River and its tributaries. These soils are in Cumberland County. Slope is less than 2 percent.

Typical pedon of Wahee loam, in Cumberland County, about 6 miles north of Fayetteville, 0.2 mile east of the intersection of State Road 1714 and State Road 1720 along State Road 1720, and 0.2 mile north of the road:

- Ap—0 to 6 inches; dark grayish brown (10YR 4/2) loam; weak fine granular structure; friable; common fine roots; slightly acid; clear smooth boundary.
- BA—6 to 10 inches; yellowish brown (10YR 5/6) clay loam; moderate medium subangular blocky structure; firm, sticky; common fine roots; few fine continuous pores; thick clay films on faces of peds; common fine flakes of mica; very strongly acid; gradual wavy boundary.
- Btg—10 to 38 inches; gray (10YR 6/1) clay; common medium distinct yellowish brown (10YR 5/8) mottles; moderate medium prismatic structure; firm, sticky; common fine roots; few fine continuous pores; common fine flakes of mica; very strongly acid; gradual wavy boundary.
- BCg—38 to 45 inches; gray (10YR 6/1) clay loam; common medium distinct strong brown (7.5YR 5/8) mottles; moderate medium angular blocky structure; firm, sticky; common fine roots; few fine continuous pores; common fine flakes of mica; very strongly acid; gradual wavy boundary.
- Cg—45 to 65 inches; gray (10YR 6/1) sand stratified with sandy clay loam; few fine prominent yellowish red (5YR 5/8) and few fine distinct strong brown (7.5YR 5/6) mottles; single grained; loose; common fine flakes of mica; very strongly acid.

The loamy and clayey horizons are 40 to 80 inches deep to stratified sediment deposited by the river. Reaction is very strongly acid or strongly acid, except where the surface has been limed.

The A or Ap horizon has hue of 10YR or 2.5Y, value of 3 through 5, and chroma of 0 through 6. The E

horizon has hue of 10YR or 2.5Y, value of 5 through 7, and chroma of 2 through 4.

The BA horizon, where present, has hue of 10YR or 2.5Y, value of 5 or 6, and chroma of 3 through 8. In some pedons it is mottled with gray. It is sandy clay loam or clay loam. If there is no BA horizon, the upper part of the Bt horizon has hue of 10YR or 2.5Y, value of 5 or 6, and chroma of 3 through 8. It has few to many gray mottles. If the BA horizon is present, the Bt horizon has hue of 10YR or 2.5Y, value of 4 to 7, and chroma of 1 or 2. The lower part of the Bt horizon is mottled in shades of gray, yellow, brown, or red. It is clay, sandy clay, clay loam, or silty clay. The BCg horizon, where present, has hue of 10YR through 5Y or neutral, value of 5 or 7, and chroma of 2 or less. It is sandy clay, silty clay loam, clay loam, sandy clay loam, or fine sandy loam.

The Cg horizon has hue of 10YR through 5Y or neutral, value of 5 through 7, and chroma of 2 or less. It is sand, loamy sand, sandy clay loam, or clay loam.

Wickham Series

The Wickham series consists of well drained soils that formed in loamy fluvial sediment on terraces of Cape Fear River and its major tributaries. These soils are in Cumberland County. Slope ranges from 1 to 6 percent.

Typical pedon of Wickham fine sandy loam, 1 to 6 percent slopes, in Cumberland County, about 2 miles east of Fayetteville, 150 feet west of the intersection of State Road 2005 and State Road 2000 along State Road 2000, and 100 feet north of the road:

- Ap—0 to 7 inches; dark brown (10YR 4/3) fine sandy loam; weak fine granular structure; very friable; common fine roots; medium acid; clear smooth boundary.
- Bt1—7 to 25 inches; red (2.5YR 4/6) sandy clay loam; weak fine and medium subangular blocky structure; friable; common fine roots; few fine flakes of mica; slightly acid; gradual wavy boundary.
- Bt2—25 to 37 inches; red (2.5YR 4/6) sandy clay loam; weak fine and medium subangular blocky structure; friable; few fine flakes of mica; medium acid; gradual wavy boundary.
- BC—37 to 46 inches; yellowish red (5YR 4/8) sandy loam; weak fine subangular blocky structure; very friable; few fine flakes of mica; medium acid; gradual wavy boundary.
- 2C1—46 to 63 inches; yellowish red (5YR 5/8) loamy sand; weak fine granular structure; very friable; medium acid; gradual wavy boundary.
- 2C2—63 to 80 inches; strong brown (7.5YR 5/6) sand; common coarse distinct pale brown (10YR 6/3) mottles; common medium sized pockets of white (10YR 8/1) uncoated sand; single grained; loose; medium acid.

The loamy horizon is 40 to 60 inches deep to sandy alluvial sediment. Reaction ranges from very strongly acid through medium acid in all horizons, except where the surface has been limed. Mica flakes are few to common throughout most pedons.

The Ap or A horizon has hue of 10YR, value of 4 or 5, and chroma of 2 or 3 or value of 6 and chroma of 2 through 4; or it has hue of 7.5YR, value of 4, and chroma of 2 or 4.

The Bt horizon has hue of 5YR, value of 4 through 6, and chroma of 4 through 8; or it has hue of 2.5YR, value of 4 or 5, and chroma of 4 through 8 or value of 6 and chroma of 6 or 8. It is sandy clay loam or clay loam. The BC horizon has hue of 5YR or 7.5YR, value of 4 to 6, and chroma of 6 through 8. Texture is sandy loam or loamy sand.

The 2C horizon has hue of 5YR, value of 5, and chroma of 6 or 8; or it has hue of 7.5YR, value of 5 or 6, and chroma of 6. It is loamy sand or sand. Layers of gravel are present in some pedons.

Woodington Series

The Woodington series consists of poorly drained soils that formed in loamy sediment on uplands. Slope is less than 2 percent.

Typical pedon of Woodington loamy sand, in Cumberland County, about 3 miles southeast of Vander, 0.8 mile southeast of the intersection of State Road 1842 and N.C. Highway 24 along N.C. Highway 24, 800 feet south of the road:

A—0 to 5 inches; very dark gray (10YR 3/1) loamy sand; weak fine granular structure; very friable; common

fine roots; very strongly acid; clear smooth boundary.

E—5 to 11 inches; grayish brown (10YR 5/2) loamy sand; weak fine granular structure; very friable; common fine and few medium roots; very strongly acid; gradual wavy boundary.

Btg—11 to 28 inches; gray (10YR 6/1) sandy loam; few medium distinct yellowish brown (10YR 5/6) mottles; weak fine subangular blocky structure; friable; few fine roots; few coarse pockets of clean sand; very strongly acid; gradual wavy boundary.

BCg1—28 to 37 inches; gray (10YR 6/1) loamy sand; few fine distinct yellowish brown (10YR 5/6) mottles; weak fine granular structure; very friable; few fine roots; few coarse pockets of clean sand; very strongly acid; gradual wavy boundary.

BCg2—37 to 65 inches; gray (10YR 6/1) loamy sand; weak fine granular structure; very friable; few coarse pockets of clean sand; very strongly acid.

The sandy and loamy horizons are more than 60 inches deep to stratified sediment of the Coastal Plain. Reaction ranges from very strongly acid through medium acid in all horizons, except where the surface has been limed.

The Ap or A horizon has hue of 10YR, value of 3 or 4, and chroma of 1 or 2. The E horizon has hue of 10YR, value of 5 through 7, and chroma of 1 or 2.

The Btg horizon has hue of 10YR, value of 5 through 7, and chroma of 1 or 2. It has few to common high chroma mottles. It is sandy loam or fine sandy loam. The BCg horizon is similar in color to the Btg horizon. It is loamy sand, loamy fine sand, fine sandy loam, or sandy loam.

References

- (1) American Association of State Highway [and Transportation] Officials. 1970. Standard specifications for highway materials and methods of sampling and testing. Ed. 10, 2 vol., illus.
- (2) American Society for Testing and Materials. 1974. Method for classification of soils for engineering purposes. ASTM Stand. D 2487-69. *In* 1974 Annual Book of ASTM Standards, Part 19, 464 pp., illus.
- (3) Austin, Morris E. 1965. Land resource regions and major land resource areas of the United States. U.S. Dep. Agric. Handb. 296, 82 pp., map.
- (4) Perkins, S. O., W. A. Davis, and S. F. Davidson. 1925. Soil survey of Cumberland County, North Carolina, U.S. Dep. Agric., Bureau of Soils, 151 pp.
- (5) Schipf, Robert G. 1961. Geology and ground water resources of Fayetteville Area. N.C. Dep. of Water Resour., Ground Water Bull. 3: p. 2.
- (6) Sharpe, William, 1965. A new geography of North Carolina. Sharpe Publ. Co., Raleigh, N.C., vol. III, pp. 1250-1278 and vol. IV, pp. 1905-1918, illus.
- (7) Stuckey, J. L. and S. G. Conrad. 1958. Explanatory text for geologic map of North Carolina. N.C. Dep. of Conservation and Development, Div. of Mineral Resour., Bull. 71: pp 42-47.
- (8) United States Department of Agriculture. 1951. Soil survey manual. U.S. Dep. Agric. Handb. 18, 503 pp., illus. [Supplements replacing pp. 173-188 issued May 1962.]
- (9) United States Department of Agriculture. 1972. Soil survey laboratory methods and procedures for collecting soil samples. Soil Surv. Invest. Rep. 1, 63 pp., illus.
- (10) United States Department of Agriculture. 1974. Forest statistics for the southern Coastal Plain of North Carolina, 1973. Forest Serv. Resour. Bull. SE-26.
- (11) United States Department of Agriculture. 1975. North Carolina's Timber, 1974. Forest Serv. Resour. Bull. SE-33. Illus.
- (12) United States Department of Agriculture. 1975. Soil taxonomy: A basic system of soil classification for making and interpreting soil surveys. Soil Conserv. Serv., U.S. Dep. Agric. Handb. 436, 754 pp., illus.
- (13) Vanatta, E. S., W. B. Cobb, L. L. Brinkley, and S. F. Davidson. 1921. Soil survey of Hoke County, North Carolina, U.S. Dep. Agric., Bureau of Soils, 32 pp.

Glossary

Aeration, soil. The exchange of air in soil with air from the atmosphere. The air in a well aerated soil is similar to that in the atmosphere; the air in a poorly aerated soil is considerably higher in carbon dioxide and lower in oxygen.

Alluvium. Material, such as sand, silt, or clay, deposited on land by streams.

Area reclaim (in tables). An area difficult to reclaim after the removal of soil for construction and other uses. Revegetation and erosion control are extremely difficult.

Available water capacity (available moisture capacity). The capacity of soils to hold water available for use by most plants. It is commonly defined as the difference between the amount of soil water at field moisture capacity and the amount at wilting point. It is commonly expressed as inches of water per inch of soil. The capacity, in inches, in a 60-inch profile or to a limiting layer is expressed as—

	Inches
Very low.....	0 to 3
Low.....	3 to 6
Moderate.....	6 to 9
High.....	9 to 12
Very high.....	more than 12

Carolina bays. Oval depressions on the Coastal Plain. They generally have narrow sandy rims around the southeastern end.

Clay. As a soil separate, the mineral soil particles less than 0.002 millimeter in diameter. As a soil textural class, soil material that is 40 percent or more clay, less than 45 percent sand, and less than 40 percent silt.

Clay film. A thin coating of oriented clay on the surface of a soil aggregate or lining pores or root channels.

Complex, soil. A map unit of two or more kinds of soil in such an intricate pattern or so small in area that it is not practical to map them separately at the selected scale of mapping. The pattern and proportion of the soils are somewhat similar in all areas.

Consistence, soil. The feel of the soil and the ease with which a lump can be crushed by the fingers. Terms commonly used to describe consistence are—
Loose.—Noncoherent when dry or moist; does not hold together in a mass.

Friable.—When moist, crushes easily under gentle pressure between thumb and forefinger and can be pressed together into a lump.

Firm.—When moist, crushes under moderate pressure between thumb and forefinger, but resistance is distinctly noticeable.

Plastic.—When wet, readily deformed by moderate pressure but can be pressed into a lump; will form a “wire” when rolled between thumb and forefinger.

Sticky.—When wet, adheres to other material and tends to stretch somewhat and pull apart rather than to pull free from other material.

Hard.—When dry, moderately resistant to pressure; can be broken with difficulty between thumb and forefinger.

Soft.—When dry, breaks into powder or individual grains under very slight pressure.

Cemented.—Hard; little affected by moistening.

Contour stripcropping. Growing crops in strips that follow the contour. Strips of grass or close-growing crops are alternated with strips of clean-tilled crops or summer fallow.

Control section. The part of the soil on which classification is based. The thickness varies among different kinds of soil, but for many it is that part of the soil profile between depths of 10 inches and 40 or 80 inches.

Cover crop. A close-growing crop grown primarily to improve and protect the soil between periods of regular crop production, or a crop grown between trees and vines in orchards and vineyards.

Cutbanks cave (in tables). The walls of excavations tend to cave in or slough.

Deferred grazing. Postponing grazing or resting grazingland for a prescribed period.

Diversion (or diversion terrace). A ridge of earth, generally a terrace, built to protect downslope areas by diverting runoff from its natural course.

Drainage class (natural). Refers to the frequency and duration of periods of saturation or partial saturation during soil formation, as opposed to altered drainage, which is commonly the result of artificial drainage or irrigation but may be caused by the sudden deepening of channels or the blocking of drainage outlets. Seven classes of natural soil drainage are recognized:

Excessively drained.—Water is removed from the soil very rapidly. Excessively drained soils are commonly very coarse textured, rocky, or shallow. Some are steep. All are free of the mottling related to wetness.

Somewhat excessively drained.—Water is removed from the soil rapidly. Many somewhat excessively drained soils are sandy and rapidly pervious. Some are shallow. Some are so steep that much of the water they receive is lost as runoff. All are free of the mottling related to wetness.

Well drained.—Water is removed from the soil readily, but not rapidly. It is available to plants throughout most of the growing season, and wetness does not inhibit growth of roots for significant periods during most growing seasons. Well drained soils are commonly medium textured. They are mainly free of mottling.

Moderately well drained.—Water is removed from the soil somewhat slowly during some periods. Moderately well drained soils are wet for only a short time during the growing season, but periodically they are wet long enough that most mesophytic crops are affected. They commonly have a slowly pervious layer within or directly below the solum, or periodically receive high rainfall, or both.

Somewhat poorly drained.—Water is removed slowly enough that the soil is wet for significant periods during the growing season. Wetness markedly restricts the growth of mesophytic crops unless artificial drainage is provided. Somewhat poorly drained soils commonly have a slowly pervious layer, a high water table, additional water from seepage, nearly continuous rainfall, or a combination of these.

Poorly drained.—Water is removed so slowly that the soil is saturated periodically during the growing season or remains wet for long periods. Free water is commonly at or near the surface for long enough during the growing season that most mesophytic crops cannot be grown unless the soil is artificially drained. The soil is not continuously saturated in layers directly below plow depth. Poor drainage results from a high water table, a slowly pervious layer within the profile, seepage, nearly continuous rainfall, or a combination of these.

Very poorly drained.—Water is removed from the soil so slowly that free water remains at or on the surface during most of the growing season. Unless the soil is artificially drained, most mesophytic crops cannot be grown. Very poorly drained soils are commonly level or depressed and are frequently ponded. Yet, where rainfall is high and nearly continuous, they can have moderate or high slope gradients.

Drainage, surface. Runoff, or surface flow of water, from an area.

Eluviation. The movement of material in true solution or colloidal suspension from one place to another within the soil. Soil horizons that have lost material through eluviation are eluvial; those that have received material are illuvial.

Erosion. The wearing away of the land surface by water, wind, ice, or other geologic agents and by such processes as gravitational creep.

Erosion (geologic). Erosion caused by geologic processes acting over long geologic periods and resulting in the wearing away of mountains and the building up of such landscape features as flood plains and coastal plains. Synonym: natural erosion.

Erosion (accelerated). Erosion much more rapid than geologic erosion, mainly as a result of the activities of man or other animals or of a catastrophe in nature, for example, fire, that exposes the surface.

Excess fines (in tables). Excess silt and clay in the soil. The soil is not a source of gravel or sand for construction purposes.

Fast intake (in tables). The rapid movement of water into the soil.

Fertility, soil. The quality that enables a soil to provide plant nutrients, in adequate amounts and in proper balance, for the growth of specified plants when light, moisture, temperature, tilth, and other growth factors are favorable.

Fine textured soil. Sandy clay, silty clay, and clay.

Flood plain. A nearly level alluvial plain that borders a stream and is subject to flooding unless protected artificially.

Fragipan. A loamy, brittle subsurface horizon low in porosity and content of organic matter and low or moderate in clay but high in silt or very fine sand. A fragipan appears cemented and restricts roots. When dry, it is hard or very hard and has a higher bulk density than the horizon or horizons above. When moist, it tends to rupture suddenly under pressure rather than to deform slowly.

Genesis, soil. The mode of origin of the soil. Refers especially to the processes or soil-forming factors responsible for the formation of the solum, or true soil, from the unconsolidated parent material.

Gleyed soil. Soil that formed under poor drainage, resulting in the reduction of iron and other elements in the profile and in gray colors and mottles.

Grassed waterway. A natural or constructed waterway, typically broad and shallow, seeded to grass as protection against erosion. Conducts surface water away from cropland.

Gravel. Rounded or angular fragments of rock up to 3 inches (2 millimeters to 7.5 centimeters) in diameter. An individual piece is a pebble.

Gully. A miniature valley with steep sides cut by running water and through which water ordinarily runs only after rainfall. The distinction between a gully and a rill is one of depth. A gully generally is an obstacle to farm machinery and is too deep to be obliterated by ordinary tillage; a rill is of lesser depth and can be smoothed over by ordinary tillage.

Horizon, soil. A layer of soil, approximately parallel to the surface, having distinct characteristics produced by soil-forming processes. In the identification of soil horizons, an upper case letter represents the major horizons. Numbers or lower case letters that follow represent subdivisions of the major horizons. An explanation of the subdivisions is given in the *Soil Survey Manual*. The major horizons of mineral soil are as follows:

O horizon.—An organic layer of fresh and decaying plant residue at the surface of a mineral soil.

A horizon.—The mineral horizon at or near the surface in which an accumulation of humified organic matter is mixed with the mineral material. Also, a plowed surface horizon, most of which was originally part of a B horizon.

E horizon.—The mineral horizon in which the main feature is loss of silicate clay, iron, aluminum, or some combination of these.

B horizon.—The mineral horizon below an O, A, or E horizon. The B horizon is in part a layer of transition from the overlying horizon to the underlying C horizon. The B horizon also has distinctive characteristics such as (1) accumulation of clay, sesquioxides, humus, or a combination of these; (2) prismatic or blocky structure; (3) redder or browner colors than those in the A horizon; or (4) a combination of these. The combined A and B horizons are generally called the solum, or true soil. If a soil does not have a B horizon, the A horizon alone is the solum.

C horizon.—The mineral horizon or layer, excluding indurated bedrock, that is little affected by soil-forming processes and does not have the properties typical of the A or B horizon. The material of a C horizon may be either like or unlike that in which the solum formed. If the material is known to differ from that in the solum, the Arabic numeral 2 precedes the letter C.

R layer.—Consolidated rock beneath the soil. The rock commonly underlies a C horizon, but can be directly below an A or a B horizon.

Hydrologic soil groups. Refers to soils grouped according to their runoff-producing characteristics. The chief consideration is the inherent capacity of soil bare of vegetation to permit infiltration. The slope and the kind of plant cover are not considered but are separate factors in predicting runoff. Soils are assigned to four groups. In group A are soils having a high infiltration rate when thoroughly wet

and having a low runoff potential. They are mainly deep, well drained, and sandy or gravelly. In group D, at the other extreme, are soils having a very slow infiltration rate and thus a high runoff potential. They have a claypan or clay layer at or near the surface, have a permanent high water table, or are shallow over nearly impervious bedrock or other material. A soil is assigned to two hydrologic groups if part of the acreage is artificially drained and part is undrained.

Illuviation. The movement of soil material from one horizon to another in the soil profile. Generally, material is removed from an upper horizon and deposited in a lower horizon.

Infiltration. The downward entry of water into the immediate surface of soil or other material, as contrasted with percolation, which is movement of water through soil layers or material.

Irrigation. Application of water to soils to assist in production of crops. The only method of irrigation used in the survey area is sprinkler—

Sprinkler.—Water is sprayed over the soil surface through pipes or nozzles from a pressure system.

Leaching. The removal of soluble material from soil or other material by percolating water.

Liquid limit. The moisture content at which the soil passes from a plastic to a liquid state.

Loam. Soil material that is 7 to 27 percent clay particles, 28 to 50 percent silt particles, and less than 52 percent sand particles.

Low strength. The soil is not strong enough to support loads.

Mineral soil. Soil that is mainly mineral material and low in organic material. Its bulk density is more than that of organic soil.

Minimum tillage. Only the tillage essential to crop production and prevention of soil damage.

Miscellaneous area. An area that has little or no natural soil and supports little or no vegetation.

Morphology, soil. The physical makeup of the soil, including the texture, structure, porosity, consistence, color, and other physical, mineral, and biological properties of the various horizons, and the thickness and arrangement of those horizons in the soil profile.

Mottling, soil. Irregular spots of different colors that vary in number and size. Mottling generally indicates poor aeration and impeded drainage. Descriptive terms are as follows: abundance—*few*, *common*, and *many*; size—*fine*, *medium*, and *coarse*; and contrast—*faint*, *distinct*, and *prominent*. The size measurements are of the diameter along the greatest dimension. *Fine* indicates less than 5 millimeters (about 0.2 inch); *medium*, from 5 to 15 millimeters (about 0.2 to 0.6 inch); and *coarse*, more than 15 millimeters (about 0.6 inch).

Muck. Dark colored, finely divided, well decomposed organic soil material. (See Sapric soil material.)

Munsell notation. A designation of color by degrees of the three simple variables—hue, value, and chroma. For example, a notation of 10YR 6/4 is a color of 10YR hue, value of 6, and chroma of 4.

Nutrient, plant. Any element taken in by a plant essential to its growth. Plant nutrients are mainly nitrogen, phosphorus, potassium, calcium, magnesium, sulfur, iron, manganese, copper, boron, and zinc obtained from the soil and carbon, hydrogen, and oxygen obtained from the air and water.

Organic matter. Plant and animal residue in the soil in various stages of decomposition.

Pan. A compact, dense layer in a soil that impedes the movement of water and the growth of roots. For example, *hardpan*, *fragipan*, *claypan*, *plowpan*, and *traffic pan*.

Parent material. The unconsolidated organic and mineral material in which soil forms.

Ped. An individual natural soil aggregate, such as a granule, a prism, or a block.

Percs slowly (in tables). The slow movement of water through the soil adversely affecting the specified use.

Permeability. The quality of the soil that enables water to move downward through the profile. Permeability is measured as the number of inches per hour that water moves downward through the saturated soil. Terms describing permeability are:

Very slow.....	less than 0.06 inch
Slow.....	0.06 to 0.2 inch
Moderately slow.....	0.2 to 0.6 inch
Moderate.....	0.6 inch to 2.0 inches
Moderately rapid.....	2.0 to 6.0 inches
Rapid.....	6.0 to 20 inches
Very rapid.....	more than 20 inches

Phase, soil. A subdivision of a soil series based on features that affect its use and management. For example, slope, stoniness, and thickness.

pH value. A numerical designation of acidity and alkalinity in soil. (See Reaction, soil.)

Piping (in tables). Formation of subsurface tunnels or pipelike cavities by water moving through the soil.

Plasticity index. The numerical difference between the liquid limit and the plastic limit; the range of moisture content within which the soil remains plastic.

Plastic limit. The moisture content at which a soil changes from semisolid to plastic.

Plinthite. The sesquioxide-rich, humus-poor, highly weathered mixture of clay with quartz and other diluents. It commonly appears as red mottles, usually in platy, polygonal, or reticulate patterns. Plinthite changes irreversibly to an ironstone hardpan or to irregular aggregates on repeated wetting and drying, especially if it is exposed also to

heat from the sun. In a moist soil, plinthite can be cut with a spade. It is a form of laterite.

Ponding. Standing water on soils in closed depressions. Unless the soils are artificially drained, the water can be removed only by percolation or evapotranspiration.

Poorly graded. Refers to a coarse grained soil or soil material consisting mainly of particles of nearly the same size. Because there is little difference in size of the particles, density can be increased only slightly by compaction.

Poor outlets (in tables). Refers to areas where surface or subsurface drainage outlets are difficult or expensive to install.

Productivity, soil. The capability of a soil for producing a specified plant or sequence of plants under specific management.

Profile, soil. A vertical section of the soil extending through all its horizons and into the parent material.

Reaction, soil. A measure of acidity or alkalinity of a soil, expressed in pH values. A soil that tests to pH 7.0 is described as precisely neutral in reaction because it is neither acid nor alkaline. The degree of acidity or alkalinity is expressed as—

	pH
Extremely acid.....	below 4.5
Very strongly acid.....	4.5 to 5.0
Strongly acid.....	5.1 to 5.5
Medium acid.....	5.6 to 6.0
Slightly acid.....	6.1 to 6.5
Neutral.....	6.6 to 7.3
Mildly alkaline.....	7.4 to 7.8
Moderately alkaline.....	7.9 to 8.4
Strongly alkaline.....	8.5 to 9.0
Very strongly alkaline.....	9.1 and higher

Relief. The elevations or inequalities of a land surface, considered collectively.

Residuum (residual soil material). Unconsolidated, weathered, or partly weathered mineral material that accumulated as consolidated rock disintegrated in place.

Runoff. The precipitation discharged into stream channels from an area. The water that flows off the surface of the land without sinking into the soil is called surface runoff. Water that enters the soil before reaching surface streams is called ground-water runoff or seepage flow from ground water.

Sand. As a soil separate, individual rock or mineral fragments from 0.05 millimeter to 2.0 millimeters in diameter. Most sand grains consist of quartz. As a soil textural class, a soil that is 85 percent or more sand and not more than 10 percent clay.

Sapric soil material (muck). The most highly decomposed of all organic soil material. Muck has the least amount of plant fiber, the highest bulk density, and the lowest water content at saturation of all organic soil material.

Seepage (in tables). The movement of water through the soil. Seepage adversely affects the specified use.

Series, soil. A group of soils that have profiles that are almost alike, except for differences in texture of the surface layer or of the underlying material. All the soils of a series have horizons that are similar in composition, thickness, and arrangement.

Shrink-swell. The shrinking of soil when dry and the swelling when wet. Shrinking and swelling can damage roads, dams, building foundations, and other structures. It can also damage plant roots.

Silt. As a soil separate, individual mineral particles that range in diameter from the upper limit of clay (0.002 millimeter) to the lower limit of very fine sand (0.05 millimeter). As a soil textural class, soil that is 80 percent or more silt and less than 12 percent clay.

Site index. A designation of the quality of a forest site based on the height of the dominant stand at an arbitrarily chosen age. For example, if the average height attained by dominant and codominant trees in a fully stocked stand at the age of 50 years is 75 feet, the site index is 75 feet.

Slope. The inclination of the land surface from the horizontal. Percentage of slope is the vertical distance divided by horizontal distance, then multiplied by 100. Thus, a slope of 20 percent is a drop of 20 feet in 100 feet of horizontal distance.

Slope (in tables). Slope is great enough that special practices are required to insure satisfactory performance of the soil for a specific use.

Slow intake (in tables). The slow movement of water into the soil.

Soil. A natural, three-dimensional body at the earth's surface. It is capable of supporting plants and has properties resulting from the integrated effect of climate and living matter acting on earthy parent material, as conditioned by relief over periods of time.

Soil separates. Mineral particles less than 2 millimeters in equivalent diameter and ranging between specified size limits. The names and sizes of separates recognized in the United States are as follows:

	Millime- ters
Very coarse sand.....	2.0 to 1.0
Coarse sand.....	1.0 to 0.5
Medium sand.....	0.5 to 0.25
Fine sand.....	0.25 to 0.10
Very fine sand.....	0.10 to 0.05
Silt.....	0.05 to 0.002
Clay.....	less than 0.002

Stripcropping. Growing crops in a systematic arrangement of strips or bands which provide vegetative barriers to wind and water erosion.

Structure, soil. The arrangement of primary soil particles into compound particles or aggregates. The principal forms of soil structure are—*platy*

(laminated), *prismatic* (vertical axis of aggregates longer than horizontal), *columnar* (prisms with rounded tops), *blocky* (angular or subangular), and *granular*. *Structureless* soils are either *single grained* (each grain by itself, as in dune sand) or *massive* (the particles adhering without any regular cleavage, as in many hardpans).

Subsoil. Technically, the B horizon; roughly, the part of the solum below plow depth.

Subsurface layer. Technically, the A2 or E horizon. Generally refers to a leached horizon lighter in color and lower in content of organic matter than the overlying surface layer.

Surface layer. The soil ordinarily moved in tillage, or its equivalent in uncultivated soil, ranging in depth from 4 to 10 inches (10 to 25 centimeters). Frequently designated as the "plow layer," or the "Ap horizon."

Terrace. An embankment, or ridge, constructed across sloping soils on the contour or at a slight angle to the contour. The terrace intercepts surface runoff so that water soaks into the soil or flows slowly to a prepared outlet.

Terrace (geologic). An old alluvial plain, ordinarily flat or undulating, bordering a river, a lake, or the sea.

Texture, soil. The relative proportions of sand, silt, and clay particles in a mass of soil. The basic textural classes, in order of increasing proportion of fine particles, are *sand*, *loamy sand*, *sandy loam*, *loam*, *silt loam*, *silt*, *sandy clay loam*, *clay loam*, *silty clay loam*, *sandy clay*, *silty clay*, and *clay*. The sand, loamy sand, and sandy loam classes may be further divided by specifying "coarse," "fine," or "very fine."

Thin layer (in tables). Otherwise suitable soil material too thin for the specified use.

Tilth, soil. The physical condition of the soil as related to tillage, seedbed preparation, seedling emergence, and root penetration.

Topsoil. The upper part of the soil, which is the most favorable material for plant growth. It is ordinarily rich in organic matter and is used to topdress roadbanks, lawns, and land affected by mining.

Trace elements. Chemical elements, for example, zinc, cobalt, manganese, copper, and iron, are in soils in extremely small amounts. They are essential to plant growth.

Upland (geology). Land at a higher elevation, in general, than the alluvial plain or stream terrace; land above the lowlands along streams.

Weathering. All physical and chemical changes produced in rocks or other deposits at or near the earth's surface by atmospheric agents. These changes result in disintegration and decomposition of the material.

Well graded. Refers to soil material consisting of coarse grained particles that are well distributed over a wide range in size or diameter. Such soil normally can be

easily increased in density and bearing properties by compaction. Contrasts with poorly graded soil.

Tables

TABLE 1.--TEMPERATURE AND PRECIPITATION

[Recorded in the period 1951-73 at Fayetteville, North Carolina, in Cumberland County]

Month	Temperature						Precipitation				
	Average daily maximum	Average daily minimum	Average daily	2 years in 10 will have--		Average number of growing degree days ¹	Average	2 years in 10 will have--		Average number of days with 0.10 inch or more	Average snowfall
				Maximum temperature higher than--	Minimum temperature lower than--			Less than--	More than--		
	<u>°F</u>	<u>°F</u>	<u>°F</u>	<u>°F</u>	<u>°F</u>	<u>Units</u>	<u>In</u>	<u>In</u>	<u>In</u>		<u>In</u>
January----	54.0	30.0	42.0	78	12	25	3.51	2.22	4.67	8	.7
February----	57.0	32.9	44.9	80	15	22	4.10	2.42	5.59	8	.5
March-----	63.9	38.5	51.2	84	23	111	4.10	2.59	5.45	8	.1
April-----	73.5	47.4	60.5	91	30	315	3.21	1.87	4.40	5	.0
May-----	80.7	56.3	68.5	96	37	574	3.54	2.20	4.74	6	.0
June-----	87.5	64.7	76.1	100	49	783	4.56	2.50	6.37	7	.0
July-----	90.1	68.9	79.6	101	57	918	4.94	3.02	6.66	9	.0
August-----	89.1	67.9	78.5	99	55	884	5.67	3.81	7.36	8	.0
September--	84.5	61.8	73.2	96	45	696	3.53	1.41	5.36	5	.0
October----	75.4	50.1	62.7	90	28	394	3.15	.78	5.03	5	.0
November---	66.0	38.4	52.2	84	19	103	2.40	.94	3.61	4	.0
December---	56.0	30.8	43.4	79	12	78	2.85	1.27	4.19	6	1.9
Yearly:											
Average--	73.1	49.0	61.1	---	---	---	---	---	---	---	---
Extreme--	---	---	---	101	12	---	---	---	---	---	---
Total----	---	---	---	---	---	4,903	45.56	37.72	48.60	79	3.2

¹A growing degree day is a unit of heat available for plant growth. It can be calculated by adding the maximum and minimum daily temperatures, dividing the sum by 2, and subtracting the temperature below which growth is minimal for the principal crops in the area (50° F).

TABLE 1.--TEMPERATURE AND PRECIPITATION--Continued
 [Recorded in the period 1951-73 at Pinehurst, North Carolina in Moore County]

Month	Temperature						Precipitation				
	Average daily maximum	Average daily minimum	Average	2 years in 10 will have--		Average number of growing degree days ¹	Average	2 years in 10 will have--		Average number of days with 0.10 inch or more	Average snowfall
				Maximum temperature higher than--	Minimum temperature lower than--			Less than--	More than--		
	<u>°F</u>	<u>°F</u>	<u>°F</u>	<u>°F</u>	<u>°F</u>	<u>Units</u>	<u>In</u>	<u>In</u>	<u>In</u>		<u>In</u>
January----	51.0	30.2	40.6	74	10	15	3.64	2.36	4.80	7	2.5
February---	55.3	31.8	43.6	76	10	34	4.41	2.35	6.21	7	1.0
March-----	63.5	39.4	51.5	85	20	160	4.32	2.67	5.80	7	1.1
April-----	74.8	48.2	61.5	93	29	345	3.46	2.19	4.60	6	.0
May-----	82.6	56.9	69.8	96	36	614	4.23	2.28	5.94	7	.0
June-----	87.2	63.6	75.4	99	49	762	4.85	2.84	6.62	7	.0
July-----	90.2	67.2	78.7	100	55	890	5.09	3.28	6.73	8	.0
August-----	89.6	66.6	78.1	100	53	871	4.83	1.55	7.51	7	.0
September--	83.9	60.4	72.2	95	42	666	3.94	1.13	6.20	5	.0
October----	73.9	49.0	61.5	91	26	357	3.40	.74	5.48	4	.0
November---	62.6	39.6	51.1	81	18	85	3.25	1.20	4.95	5	.0
December---	53.8	32.9	43.4	74	12	24	3.01	1.30	4.45	5	.3
Yearly:											
Average--	72.4	48.8	60.6	---	---	---	---	---	---	---	---
Extreme--	---	---	---	100	8	---	---	---	---	---	---
Total----	---	---	---	---	---	4,823	48.43	41.39	50.00	75	4.9

¹A growing degree day is a unit of heat available for plant growth. It can be calculated by adding the maximum and minimum daily temperatures, dividing the sum by 2, and subtracting the temperature below which growth is minimal for the principal crops in the area (50° F).

TABLE 2.--FREEZE DATES IN SPRING AND FALL

[Recorded in the period 1951-73 at Fayetteville,
North Carolina in Cumberland County]

Probability	Temperature		
	24° F or lower	28° F or lower	32° F or lower
Last freezing temperature in spring:			
1 year in 10 later than--	March 27	April 13	April 30
2 years in 10 later than--	March 17	April 4	April 19
5 years in 10 later than--	February 25	March 17	March 30
First freezing temperature in fall:			
1 year in 10 earlier than--	November 5	October 27	October 20
2 years in 10 earlier than--	November 11	November 1	October 24
5 years in 10 earlier than--	November 22	November 12	October 31

[Recorded in the period 1951-73 at Pinehurst,
North Carolina, in Moore County]

Probability	Temperature		
	24° F or lower	28° F or lower	32° F or lower
Last freezing temperature in spring:			
1 year in 10 later than--	March 27	April 2	April 24
2 years in 10 later than--	March 19	March 30	April 18
5 years in 10 later than--	March 5	March 23	April 5
First freezing temperature in fall:			
1 year in 10 earlier than--	November 4	October 23	October 14
2 years in 10 earlier than--	November 9	October 28	October 19
5 years in 10 earlier than--	November 19	November 7	October 28

TABLE 3.--GROWING SEASON

[Recorded in the period 1951-73, Fayetteville,
North Carolina, in Cumberland County]

Probability	Daily minimum temperature during growing season		
	Higher than 24° F	Higher than 28° F	Higher than 32° F
	Days	Days	Days
9 years in 10	231	202	175
8 years in 10	245	215	189
5 years in 10	270	239	214
2 years in 10	295	262	239
1 year in 10	308	275	253

[Recorded in the period 1951-73 at Pinehurst,
North Carolina, in Moore County]

Probability	Daily minimum temperature during growing season		
	Higher than 24° F	Higher than 28° F	Higher than 32° F
	Days	Days	Days
9 years in 10	228	210	180
8 years in 10	238	216	189
5 years in 10	258	228	205
2 years in 10	278	240	221
1 year in 10	288	247	229

TABLE 4.--ACREAGE AND PROPORTIONATE EXTENT OF THE SOILS

Map symbol	Soil name	Cumberland County Acres	Hoke County Acres	Total--	
				Area Acres	Extent Pct
AaA	Altavista fine sandy loam, 0 to 3 percent slopes-----	6,517	0	6,517	1.0
AuA	Autryville loamy sand, 0 to 2 percent slopes-----	17,566	6,330	23,896	3.6
AyB	Aycock loam, 1 to 4 percent slopes-----	2,363	0	2,363	0.4
BaB	Blaney loamy sand, 2 to 8 percent slopes-----	13,725	46,330	60,055	9.0
BaD	Blaney loamy sand, 8 to 15 percent slopes-----	14,587	18,220	32,807	4.9
BdB	Blaney-Urban land complex, 2 to 8 percent slopes-----	1,932	0	1,932	0.3
BdD	Blaney-Urban land complex, 8 to 15 percent slopes-----	1,889	0	1,889	0.3
BrB	Bragg sandy loam, 1 to 4 percent slopes-----	1,560	550	2,110	0.3
BuA	Butters loamy sand, 0 to 2 percent slopes-----	2,576	1,040	3,616	0.6
By	Byars loam-----	2,056	270	2,326	0.3
CaB	Candor sand, 1 to 8 percent slopes-----	32,368	25,580	57,948	8.7
CaD	Candor sand, 8 to 15 percent slopes-----	1,662	1,520	3,182	0.5
Cf	Cape Fear loam-----	5,562	0	5,562	0.8
Ch	Chewacla loam-----	2,730	100	2,830	0.4
Co	Coxville loam-----	3,595	5,040	8,635	1.3
CrB	Craven loam, 1 to 4 percent slopes-----	1,841	0	1,841	0.3
CT	Croatan muck-----	12,390	0	12,390	1.9
De	Deloss loam-----	4,745	0	4,745	0.7
DgA	Dogue fine sandy loam, 0 to 2 percent slopes-----	2,918	0	2,918	0.4
DhA	Dothan loamy sand, 0 to 2 percent slopes-----	170	2,770	2,940	0.4
Dn	Dunbar loam-----	1,626	490	2,116	0.3
DpA	Duplin sandy loam, 0 to 3 percent slopes-----	3,846	1,770	5,616	0.8
DT	Dystrochrepts, steep-----	2,520	0	2,520	0.4
ExA	Exum loam, 0 to 2 percent slopes-----	5,432	0	5,432	0.8
FaA	Faceville loamy sand, 0 to 2 percent slopes-----	408	500	908	0.1
FaB	Faceville loamy sand, 2 to 6 percent slopes-----	2,956	1,130	4,086	0.6
FcB	Faceville-Urban land complex, 0 to 6 percent slopes-----	5,548	830	6,378	1.0
FuB	Fuquay sand, 0 to 4 percent slopes-----	2,442	5,970	8,412	1.3
GdB	Gilead loamy sand, 2 to 8 percent slopes-----	6,640	10,590	17,230	2.6
GdD	Gilead loamy sand, 8 to 15 percent slopes-----	1,034	3,440	4,474	0.7
GoA	Goldsboro loamy sand, 0 to 2 percent slopes-----	10,457	4,670	15,127	2.3
Gr	Grantham loam-----	6,020	0	6,020	0.9
JT	Johnston loam-----	25,957	19,280	45,237	6.8
KaA	Kalmia loamy sand, 0 to 2 percent slopes-----	910	440	1,350	0.2
KeA	Kenansville loamy sand, 0 to 3 percent slopes-----	391	140	531	0.1
KuB	Kureb sand, 1 to 8 percent slopes-----	965	0	965	0.1
LaB	Lakeland sand, 1 to 8 percent slopes-----	13,321	15,480	28,801	4.3
LbB	Lakeland-Urban land complex, 1 to 8 percent slopes-----	12,114	70	12,184	1.8
Ld	Lenoir loam-----	1,359	0	1,359	0.2
Le	Leon sand-----	6,509	50	6,559	1.0
Ly	Lynchburg sandy loam-----	2,761	1,090	3,851	0.6
Mc	McColl loam-----	313	2,930	3,243	0.5
Na	Nahunta loam-----	1,604	0	1,604	0.2
NoA	Norfolk loamy sand, 0 to 2 percent slopes-----	9,621	14,300	23,921	3.6
NoB	Norfolk loamy sand, 2 to 6 percent slopes-----	5,068	8,580	13,648	2.0
Pa	Pactolus loamy sand-----	4,266	930	5,196	0.8
Pg	Pantego loam-----	2,259	2,780	5,039	0.8
Pt	Pits-Tarboro complex-----	896	0	896	0.1
Ra	Rains sandy loam-----	9,863	10,460	20,323	3.0
Ro	Roanoke and Wahee loams-----	28,847	0	28,847	4.3
Ru	Roanoke-Urban land complex-----	1,224	0	1,224	0.2
St	Stallings loamy sand-----	3,781	350	4,131	0.6
TaB	Tarboro loamy sand, 0 to 6 percent slopes-----	8,443	0	8,443	1.3
TR	Torhunta and Lynn Haven soils-----	25,269	1,950	27,219	4.1
Ud	Udorthents, loamy-----	727	370	1,097	0.2
Ur	Urban land-----	1,418	0	1,418	0.2
VaB	Vaucluse loamy sand, 2 to 8 percent slopes-----	4,335	5,520	9,855	1.5
VaD	Vaucluse loamy sand, 8 to 15 percent slopes-----	8,990	4,570	13,560	2.0
VgE	Vaucluse-Gilead loamy sands, 15 to 25 percent slopes-----	2,063	905	2,968	0.4
WaB	Wagram loamy sand, 0 to 6 percent slopes-----	25,446	15,050	40,496	6.1
WgB	Wagram-Urban land complex, 0 to 8 percent slopes-----	11,987	430	12,417	1.9
WmB	Wickham fine sandy loam, 1 to 6 percent slopes-----	14,197	0	14,197	2.1
WnB	Wickham-Urban land complex, 1 to 6 percent slopes-----	1,553	0	1,553	0.2
Wo	Woodington loamy sand-----	4,902	1,025	5,927	0.9
Total-----		423,040	243,840	666,880	100.0

TABLE 5.--YIELDS PER ACRE OF CROPS AND PASTURE

[Yields are those that can be expected under a high level of management. Absence of a yield indicates that the soil is not suited to the crop or the crop generally is not grown on the soil]

Soil name and map symbol	Corn	Soybeans	Tobacco	Wheat	Cotton lint	Improved bermuda- grass
	<u>Bu</u>	<u>Bu</u>	<u>Lb</u>	<u>Bu</u>	<u>Lb</u>	<u>AUM*</u>
AaA----- Altavista	120	45	2,600	55	550	---
AuA----- Autryville	75	30	2,200	---	600	9.0
AyB----- Aycock	120	40	2,700	60	700	10.0
BaB----- Blaney	60	25	---	30	450	8.0
BaD----- Blaney	---	---	2,000	---	---	7.0
BdB----- Blaney-Urban land	---	---	---	---	---	---
BdD----- Blaney-Urban land	---	---	---	---	---	---
BrB----- Bragg	---	---	---	---	---	6.0
BuA----- Butters	100	35	2,400	50	---	10.0
By----- Byars	120	45	---	---	---	---
CaB----- Candor	45	20	1,700	---	---	6.0
CaD----- Candor	40	15	1,300	---	---	6.0
Cf----- Cape Fear	120	45	---	---	---	---
Ch----- Chewacla	80	30	---	---	---	---
Co----- Coxville	110	40	---	---	---	---
CrB----- Craven	105	40	2,500	50	500	---
CT----- Croatan	---	---	---	---	---	---
De----- Deloss	120	45	---	---	---	---
DgA----- Dogue	125	45	2,500	60	---	---
DhA----- Dothan	120	40	2,800	---	900	---
Dn----- Dunbar	115	45	2,600	55	600	---

See footnote at end of table.

TABLE 5.--YIELDS PER ACRE OF CROPS AND PASTURE--Continued

Soil name and map symbol	Corn	Soybeans	Tobacco	Wheat	Cotton lint	Improved bermuda- grass
	Bu	Bu	Lb	Bu	Lb	AUM*
DpA----- Duplin	110	50	2,800	60	750	---
DT. Dystrochrepts						
ExA----- Exum	125	50	3,000	---	750	---
FaA----- Faceville	115	45	---	---	875	10.0
FaB----- Faceville	115	45	---	---	875	10.0
FcB----- Faceville-Urban land	---	---	---	---	---	---
FuB----- Fuquay	80	30	2,400	---	650	---
GdB----- Gilead	75	35	2,200	---	---	7.0
GdD----- Gilead	---	---	---	---	---	5.5
GoA----- Goldsboro	125	45	3,000	60	700	---
Gr----- Grantham	110	40	---	---	---	---
JT----- Johnston	---	---	---	---	---	---
KaA----- Kalmia	110	45	2,900	60	750	---
KeA----- Kenansville	85	35	2,400	---	550	---
KuB----- Kureb	---	---	---	---	---	---
LaB----- Lakeland	55	20	1,700	---	---	7.0
LbB----- Lakeland-Urban land	---	---	---	---	---	---
Ld----- Lenoir	100	40	2,200	---	525	---
Le----- Leon	50	20	---	---	---	---
Ly----- Lynchburg	115	45	2,800	---	675	---
Mc----- McColl	115	45	---	---	---	---
Na----- Nahunta	120	45	2,800	---	675	---
NoA----- Norfolk	110	40	3,000	60	700	---

See footnote at end of table.

TABLE 5.--YIELDS PER ACRE OF CROPS AND PASTURE--Continued

Soil name and map symbol	Corn	Soybeans	Tobacco	Wheat	Cotton lint	Improved bermuda- grass AUM*
	Bu	Bu	Lb	Bu	Lb	
NoB----- Norfolk	100	35	2,900	55	650	---
Pa----- Pactolus	65	25	1,800	---	---	---
Pg----- Pantego	120	45	---	---	---	---
Pt**----- Pits-Tarboro	---	---	---	---	---	---
Ra----- Rains	115	40	---	---	---	---
Ro----- Roanoke and Wahee	115	40	---	---	---	---
Ru----- Roanoke-Urban land	---	---	---	---	---	---
St----- Stallings	100	35	2,500	---	550	---
TaB----- Tarboro	50	20	---	---	---	---
TR----- Torhunta and Lynn Haven	---	---	---	---	---	---
Ud. Udorthents						
Ur**. Urban land						
VaB----- Vaucluse	65	25	---	---	500	8.0
VaD----- Vaucluse	55	15	---	---	350	7.0
VgE----- Vaucluse-Gilead	---	---	---	---	---	---
WaB----- Wagram	75	25	2,400	40	550	---
WgB----- Wagram-Urban land	---	---	---	---	---	---
WmB----- Wickham	115	40	2,600	---	750	---
WnB----- Wickham-Urban land	---	---	---	---	---	---
Wo----- Woodington	100	35	---	---	---	---

* Animal-unit-month: The amount of forage or feed required to feed one animal unit (one cow, one horse, one mule, five sheep, or five goats) for 30 days.

** See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 6.--CAPABILITY CLASSES AND SUBCLASSES

[Miscellaneous areas are excluded. Dashes indicate no acreage]

Class	Total acreage	Major management concerns (Subclass)		
		Erosion (e)	Wetness (w)	Soil problem (s)
		<u>Acres</u>	<u>Acres</u>	<u>Acres</u>
I:				
Cumberland County-----	11,109	---	---	---
Hoke County-----	18,010	---	---	---
II:				
Cumberland County-----	132,922	28,631	49,038	55,253
Hoke County-----	47,328	10,183	8,370	28,775
III:				
Cumberland County-----	75,862	10,041	1,359	64,462
Hoke County-----	89,500	11,140	---	78,360
IV:				
Cumberland County-----	75,554	24,653	29,014	21,887
Hoke County-----	55,966	22,790	16,137	17,039
V:				
Cumberland County-----	19,447	---	19,447	---
Hoke County-----	---	---	---	---
VI:				
Cumberland County-----	48,998	4,190	44,808	---
Hoke County-----	13,291	4,824	8,467	---
VII:				
Cumberland County-----	39,312	---	38,347	965
Hoke County-----	19,280	---	19,280	---
VIII:				
Cumberland County-----	---	---	---	---
Hoke County-----	---	---	---	---

TABLE 7.--WOODLAND MANAGEMENT AND PRODUCTIVITY

[Only the soils suitable for production of commercial trees are listed. Absence of an entry indicates that information was not available]

Soil name and map symbol	Ordination symbol	Management concerns			Potential productivity		Trees to plant
		Erosion hazard	Equipment limitation	Seedling mortality	Common trees	Site index	
AaA----- Altavista	2w	Slight	Moderate	Slight	Loblolly pine-----	91	Loblolly pine, yellow-poplar, black walnut, sweetgum, American sycamore, cherrybark oak.
					Longleaf pine-----	84	
					Shortleaf pine-----	77	
					Sweetgum-----	87	
					White oak-----	---	
AuA----- Autryville	3s	Slight	Moderate	Moderate	Loblolly pine-----	77	Loblolly pine, longleaf pine.
					Longleaf pine-----	---	
AyB----- Aycock	2o	Slight	Slight	Slight	Loblolly pine-----	89	Loblolly pine.
					Longleaf pine-----	75	
					Southern red oak-----	80	
BaB, BaD----- Blaney	3s	Slight	Moderate	Moderate	Loblolly pine-----	76	Longleaf pine.
					Longleaf pine-----	66	
BrB----- Bragg	4s	Slight	Slight	Moderate	Loblolly pine-----	---	Longleaf pine, loblolly pine.
					Longleaf pine-----	---	
BuA----- Butters	2o	Slight	Slight	Slight	Loblolly pine-----	86	Loblolly pine.
					Longleaf pine-----	76	
					Sweetgum-----	---	
					Southern red oak-----	---	
By----- Byars	2w	Slight	Severe	Severe	Loblolly pine-----	95	Loblolly pine, water tupelo, American sycamore.
					Sweetgum-----	90	
					Water tupelo-----	90	
					Water oak-----	90	
CaB, CaD----- Candor	3s	Slight	Moderate	Moderate	Loblolly pine-----	75	Loblolly pine, longleaf pine.
					Longleaf pine-----	65	
Cf----- Cape Fear	1w	Slight	Severe	Severe	Sweetgum-----	---	Loblolly pine, water tupelo, American sycamore, sweetgum.
					Loblolly pine-----	100	
					Water oak-----	---	
					Water tupelo-----	---	
					Baldcypress-----	---	
Ch----- Chewacla	1w	Slight	Moderate	Slight	Loblolly pine-----	96	Loblolly pine, American sycamore, yellow-poplar, sweetgum, green ash.
					Yellow-poplar-----	100	
					American sycamore-----	---	
					Sweetgum-----	97	
					Water oak-----	86	
					Eastern cottonwood-----	---	
					Green ash-----	---	
					Southern red oak-----	---	
Co----- Coxville	2w	Slight	Severe	Moderate	Loblolly pine-----	90	Loblolly pine.
					Longleaf pine-----	---	
					Sweetgum-----	---	
					Blackgum-----	---	
					Water oak-----	---	
					Willow oak-----	---	
					Water tupelo-----	---	
					Elm-----	---	
					Hickory-----	---	
CrB----- Craven	3w	Slight	Moderate	Slight	Loblolly pine-----	81	Loblolly pine.
					Longleaf pine-----	67	
					Water oak-----	---	
					Sweetgum-----	---	
					White oak-----	---	
					Southern red oak-----	---	
					Red maple-----	---	

See footnote at end of table.

TABLE 7.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management concerns			Potential productivity		Trees to plant
		Erosion hazard	Equipment limitation	Seedling mortality	Common trees	Site index	
CT----- Croatan	4w	Slight	Severe	Severe	Pond pine----- Water tupelo----- Baldcypress----- Loblolly pine----- Sweetgum----- Swamp tupelo----- Atlantic white-cedar---	55 60 --- 70 --- --- ---	Loblolly pine.
De----- Deloss	3w	Slight	Severe	Severe	Willow oak----- Loblolly pine----- Baldcypress-----	--- --- ---	Loblolly pine, American sycamore, water tupelo, sweetgum.
DgA----- Dogue	2w	Slight	Moderate	Slight	Loblolly pine----- Southern red oak----- Sweetgum----- Yellow-poplar----- White oak-----	90 80 90 93 80	Loblolly pine.
DhA----- Dothan	2o	Slight	Slight	Slight	Longleaf pine----- Loblolly pine-----	70 ---	Loblolly pine, longleaf pine.
Dn----- Dunbar	2w	Slight	Moderate	Moderate	Loblolly pine----- Longleaf pine----- Water oak----- Water tupelo----- Yellow-poplar----- Sweetgum-----	90 70 --- --- --- 90	Loblolly pine, sweetgum, yellow-poplar.
DpA----- Duplin	2w	Slight	Moderate	Moderate	Loblolly pine----- Sweetgum----- Blackgum----- Southern red oak----- White oak----- Yellow-poplar-----	90 --- --- --- --- 100	Loblolly pine, yellow-poplar, American sycamore, sweetgum.
ExA----- Exum	2w	Slight	Moderate	Slight	Loblolly pine----- Longleaf pine----- Sweetgum----- Yellow-poplar----- Southern red oak----- White oak-----	90 77 90 100 --- ---	Loblolly pine, yellow-poplar, sweetgum, American sycamore.
FaA, FaB----- Faceville	3o	Slight	Slight	Slight	Loblolly pine----- Longleaf pine-----	82 65	Loblolly pine.
FuB----- Fuquay	3s	Slight	Moderate	Moderate	Loblolly pine----- Longleaf pine-----	83 67	Longleaf pine.
GdB, GdD----- Gilead	3o	Slight	Slight	Slight	Loblolly pine----- Longleaf pine----- Sweetgum-----	83 66 ---	Loblolly pine.
GoA----- Goldsboro	2w	Slight	Moderate	Slight	Loblolly pine----- Longleaf pine----- Sweetgum----- Southern red oak----- White oak-----	90 77 90 --- ---	Loblolly pine, yellow-poplar, American sycamore, sweetgum.
Gr----- Grantham	2w	Slight	Severe	Severe	Loblolly pine-----	86	Loblolly pine, sweetgum, American sycamore, yellow-poplar.

See footnote at end of table.

TABLE 7.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management concerns			Potential productivity		Trees to plant
		Erosion hazard	Equipment limitation	Seedling mortality	Common trees	Site index	
JT----- Johnston	1w	Slight	Severe	Severe	Water tupelo----- Swamp tupelo----- Water oak----- Pond pine----- Baldcypress----- Loblolly pine-----	--- --- --- --- --- 96	Loblolly pine, baldcypress, American sycamore, sweetgum, green ash.
KaA----- Kalmia	2o	Slight	Slight	Slight	Loblolly pine----- Sweetgum----- Yellow-poplar----- Southern red oak----- White oak-----	88 85 96 --- ---	Loblolly pine, yellow-poplar, cherrybark oak.
KeA----- Kenansville	3s	Slight	Moderate	Moderate	Loblolly pine----- Longleaf pine-----	80 65	Loblolly pine.
KuB----- Kureb	5s	Slight	Severe	Severe	Longleaf pine----- Sand pine-----	52 ---	Longleaf pine.
LaB----- Lakeland	4s	Slight	Moderate	Moderate	Loblolly pine----- Longleaf pine-----	75 60	Loblolly pine.
Ld----- Lenoir	2w	Slight	Moderate	Moderate	Loblolly pine-----	90	Loblolly pine, longleaf pine, sweetgum, American sycamore.
Le----- Leon	4w	Slight	Moderate	Moderate	Longleaf pine-----	65	
Ly----- Lynchburg	2w	Slight	Moderate	Slight	Loblolly pine----- Longleaf pine----- Yellow-poplar----- Sweetgum----- Southern red oak----- White oak----- Blackgum-----	86 74 92 90 --- --- ---	Loblolly pine, American sycamore, sweetgum.
Mc----- McColl	5w	Slight	Severe	Severe	Baldcypress----- Water tupelo-----	--- ---	Baldcypress, water tupelo.
Na----- Nahunta	2w	Slight	Moderate	Moderate	Loblolly pine----- Sweetgum----- Yellow-poplar----- Southern red oak----- White oak-----	87 90 100 --- ---	Loblolly pine, yellow-poplar, American sycamore, cherrybark oak.
NoA, NoB----- Norfolk	2o	Slight	Slight	Slight	Loblolly pine----- Longleaf pine-----	86 68	Loblolly pine.
Pa----- Pactolus	3w	Slight	Moderate	Moderate	Loblolly pine----- Longleaf pine-----	84 70	Loblolly pine.
Pg----- Pantego	1w	Slight	Severe	Severe	Loblolly pine----- Pond pine----- Baldcypress----- Water tupelo----- Water oak-----	98 73 --- --- ---	Loblolly pine, sweetgum, American sycamore, water tupelo.
Pt*: Pits.							
Tarboro-----	4s	Slight	Moderate	Moderate	Loblolly pine----- Longleaf pine-----	71 ---	Loblolly pine.

See footnote at end of table.

TABLE 7.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management concerns			Potential productivity		Trees to plant
		Erosion hazard	Equipment limitation	Seedling mortality	Common trees	Site index	
Ra----- Rains	2w	Slight	Severe	Severe	Loblolly pine----- Sweetgum-----	94 90	Loblolly pine, sweetgum, American sycamore.
Ro*: Roanoke-----	2w	Slight	Severe	Severe	Loblolly pine----- Virginia pine----- Willow oak----- Yellow-poplar-----	86 76 76 90	Loblolly pine, sweetgum, yellow- poplar.
Wahee-----	2w	Slight	Moderate	Moderate	Loblolly pine----- Sweetgum-----	86 90	Loblolly pine, sweetgum, American sycamore, water oak.
St----- Stallings	3w	Slight	Moderate	Slight	Loblolly pine----- Longleaf pine----- Sweetgum----- Yellow-poplar----- Water oak-----	79 --- --- --- ---	Loblolly pine, yellow-poplar, American sycamore, sweetgum.
TaB----- Tarboro	4s	Slight	Moderate	Moderate	Loblolly pine----- Longleaf pine-----	71 ---	Loblolly pine.
TR*: Torhunta-----	2w	Slight	Severe	Severe	Loblolly pine----- Sweetgum----- Water tupelo-----	90 90 ---	Loblolly pine, sweetgum, American sycamore, Shumard oak.
Lynn Haven-----	3w	Slight	Moderate	Moderate	Loblolly pine----- Longleaf pine----- Pond pine-----	80 70 70	Loblolly pine.
VaB, VaD----- Vaucluse	3o	Slight	Slight	Slight	Loblolly pine----- Shortleaf pine----- Longleaf pine-----	76 56 ---	Loblolly pine.
VgE*: Vaucluse-----	3o	Slight	Slight	Slight	Loblolly pine----- Shortleaf pine----- Longleaf pine-----	76 56 ---	Loblolly pine.
Gilead-----	3o	Slight	Slight	Slight	Loblolly pine----- Longleaf pine----- Sweetgum-----	83 66 ---	Loblolly pine.
WaB----- Wagram	3s	Slight	Moderate	Moderate	Loblolly pine----- Longleaf pine-----	82 67	Loblolly pine, longleaf pine.
WmB----- Wickham	2o	Slight	Slight	Slight	Loblolly pine----- Yellow-poplar----- Southern red oak-----	90 100 ---	Loblolly pine, yellow-poplar.
Wo----- Woodington	3w	Slight	Severe	Severe	Loblolly pine----- Sweetgum----- White oak----- Southern red oak----- Water tupelo-----	83 --- --- --- ---	Loblolly pine, American sycamore, water tupelo, water oak, sweetgum.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 8.--RECREATIONAL DEVELOPMENT

[Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe." Absence of an entry indicates that the soil was not rated]

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
AaA----- Altavista	Severe: flooding.	Moderate: wetness.	Moderate: wetness.	Moderate: wetness.	Moderate: wetness.
AuA----- Autryville	Moderate: too sandy.	Moderate: too sandy.	Moderate: too sandy.	Moderate: too sandy.	Moderate: droughty.
AyB----- Aycock	Slight-----	Slight-----	Moderate: slope.	Slight-----	Slight.
BaB----- Blaney	Moderate: percs slowly, too sandy.	Moderate: percs slowly, too sandy.	Moderate: slope, too sandy.	Moderate: too sandy.	Severe: droughty.
BaD----- Blaney	Moderate: slope, percs slowly, too sandy.	Moderate: slope, percs slowly, too sandy.	Severe: slope.	Moderate: too sandy.	Severe: droughty.
BdB*: Blaney----- Urban land.	Moderate: percs slowly, too sandy.	Moderate: percs slowly, too sandy.	Moderate: slope, too sandy.	Moderate: too sandy.	Severe: droughty.
BdD*: Blaney----- Urban land.	Moderate: slope, percs slowly, too sandy.	Moderate: slope, percs slowly, too sandy.	Severe: slope.	Moderate: too sandy.	Severe: droughty.
BrB----- Bragg	Moderate: percs slowly.	Moderate: percs slowly.	Moderate: slope, percs slowly.	Slight-----	Slight.
BuA----- Butters	Slight-----	Slight-----	Slight-----	Slight-----	Moderate: droughty.
By----- Byars	Severe: ponding, wetness.	Severe: ponding, wetness.	Severe: ponding, wetness.	Severe: ponding, wetness.	Severe: ponding, wetness.
CaB----- Candor	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Moderate: droughty, too sandy.
CaD----- Candor	Severe: too sandy.	Severe: too sandy.	Severe: slope, too sandy.	Severe: too sandy.	Moderate: droughty, too sandy.
Cf----- Cape Fear	Severe: flooding, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
Ch----- Chewacla	Severe: flooding, wetness.	Severe: wetness.	Severe: wetness, flooding.	Severe: wetness.	Severe: wetness, flooding.
Co----- Coxville	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.

See footnote at end of table.

TABLE 8.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
CrB----- Craven	Moderate: wetness, percs slowly.	Moderate: wetness, percs slowly.	Moderate: slope, wetness, percs slowly.	Slight-----	Slight.
CT----- Croatan	Severe: flooding, wetness, excess humus.	Severe: wetness, excess humus.	Severe: excess humus, wetness.	Severe: wetness, excess humus.	Severe: wetness, excess humus.
De----- Deloss	Severe: flooding, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
DgA----- Dogue	Severe: flooding.	Moderate: wetness, percs slowly.	Moderate: small stones, wetness.	Moderate: wetness.	Moderate: wetness.
DhA----- Dothan	Slight-----	Slight-----	Slight-----	Slight-----	Moderate: droughty.
Dn----- Dunbar	Severe: wetness.	Moderate: wetness, percs slowly.	Severe: wetness.	Moderate: wetness.	Moderate: wetness.
DpA----- Duplin	Moderate: wetness, percs slowly.	Moderate: wetness, percs slowly.	Moderate: wetness, percs slowly.	Slight-----	Slight.
DT----- Dystrochrepts	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
ExA----- Exum	Moderate: wetness, percs slowly.	Moderate: wetness, percs slowly.	Moderate: wetness, percs slowly.	Slight-----	Slight.
FaA----- Faceville	Slight-----	Slight-----	Slight-----	Slight-----	Slight.
FaB----- Faceville	Slight-----	Slight-----	Moderate: slope.	Slight-----	Slight.
FcB*: Faceville	Slight-----	Slight-----	Moderate: slope.	Slight-----	Slight.
Urban land.					
FuB----- Fuquay	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Moderate: droughty, too sandy.
GdB----- Gilead	Moderate: percs slowly, wetness.	Moderate: percs slowly, wetness.	Moderate: slope, percs slowly, wetness.	Moderate: wetness.	Moderate: wetness.
GdD----- Gilead	Moderate: slope, percs slowly.	Moderate: percs slowly, slope.	Severe: slope.	Moderate: wetness.	Moderate: slope.
GoA----- Goldsboro	Moderate: wetness.	Moderate: wetness.	Moderate: wetness.	Slight-----	Slight.
Gr----- Grantham	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.

See footnote at end of table.

TABLE 8.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
JT----- Johnston	Severe: flooding, wetness.	Severe: wetness.	Severe: flooding, wetness.	Severe: wetness.	Severe: flooding, wetness.
KaA----- Kalmia	Severe: flooding.	Slight-----	Slight-----	Slight-----	Moderate: droughty.
KeA----- Kenansville	Severe: flooding.	Moderate: too sandy.	Moderate: too sandy.	Moderate: too sandy.	Moderate: droughty.
KuB----- Kureb	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: droughty.
LaB----- Lakeland	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Moderate: droughty, too sandy.
LbB*: Lakeland-----	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Moderate: droughty, too sandy.
Urban land.					
Ld----- Lenoir	Severe: wetness.	Moderate: wetness, percs slowly.	Severe: wetness.	Moderate: wetness.	Moderate: wetness.
Le----- Leon	Severe: wetness, too sandy.	Severe: wetness, too sandy.	Severe: too sandy, wetness.	Severe: wetness, too sandy.	Severe: wetness, droughty.
Ly----- Lynchburg	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
Mc----- McColl	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.
Na----- Nahunta	Severe: wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.	Moderate: wetness.
NoA----- Norfolk	Slight-----	Slight-----	Slight-----	Slight-----	Slight.
NoB----- Norfolk	Slight-----	Slight-----	Moderate: slope.	Slight-----	Slight.
Pa----- Pactolus	Moderate: wetness.	Moderate: wetness.	Moderate: slope, wetness.	Moderate: wetness.	Moderate: droughty.
Pg----- Pantego	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
Pt*: Pits.					
Tarboro-----	Severe: flooding.	Slight-----	Severe: slope.	Slight-----	Moderate: droughty.
Ra----- Rains	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
Ro*: Roanoke-----	Severe: flooding, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.

See footnote at end of table.

TABLE 8.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
Ro#: Wahee-----	Severe: flooding, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
Ru#: Roanoke-----	Severe: flooding, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
Urban land.					
St----- Stallings	Moderate: wetness.	Moderate: wetness.	Moderate: slope, wetness.	Moderate: wetness.	Moderate: wetness.
TaB----- Tarboro	Severe: flooding.	Slight-----	Moderate: slope.	Slight-----	Moderate: droughty.
TR#: Torhunta-----	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
Lynn Haven-----	Severe: wetness, too sandy.	Severe: wetness, too sandy.	Severe: too sandy, wetness.	Severe: wetness, too sandy.	Severe: wetness, droughty.
Ud. Udorthents					
Ur#. Urban land					
VaB----- Vaucluse	Moderate: percs slowly.	Moderate: percs slowly.	Moderate: slope, percs slowly.	Slight-----	Moderate: droughty.
VaD----- Vaucluse	Moderate: slope, percs slowly.	Moderate: slope, percs slowly.	Severe: slope.	Slight-----	Moderate: droughty, slope.
VgE#: Vaucluse-----	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
Gilead-----	Moderate: slope, percs slowly.	Moderate: percs slowly, slope.	Severe: slope.	Moderate: wetness.	Severe: slope.
WaB----- Wagram	Moderate: too sandy.	Moderate: too sandy.	Moderate: slope, too sandy.	Moderate: too sandy.	Moderate: droughty.
WgB#: Wagram-----	Moderate: too sandy.	Moderate: too sandy.	Moderate: slope, too sandy.	Moderate: too sandy.	Moderate: droughty.
Urban land.					
WmB----- Wickham	Severe: flooding.	Slight-----	Moderate: slope.	Slight-----	Slight.
WnB#: Wickham-----	Severe: flooding.	Slight-----	Moderate: slope.	Slight-----	Slight.
Urban land.					
Wo----- Woodington	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 9.--WILDLIFE HABITAT

[See text for definitions of "good," "fair," "poor," and "very poor." Absence of an entry indicates that the soil was not rated]

Soil name and map symbol	Potential for habitat elements							Potential as habitat for--		
	Grain and seed crops	Grasses and legumes	Wild herba- ceous plants	Hardwood trees	Conif- erous plants	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife
AaA----- Altavista	Good	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.
AuA----- Autryville	Fair	Fair	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
AyB----- Aycock	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
BaB----- Blaney	Fair	Fair	Fair	Fair	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.
BaD----- Blaney	Poor	Fair	Fair	Fair	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.
BdB*: Blaney----- Urban land.	Poor	Fair	Fair	Fair	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.
BdD*: Blaney----- Urban land.	Poor	Fair	Fair	Fair	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.
BrB----- Bragg	Good	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
BuA----- Butters	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
By----- Byars	Very poor.	Poor	Poor	Poor	Poor	Good	Good	Poor	Poor	Good.
CaB, CaD----- Candor	Poor	Poor	Fair	Poor	Poor	Very poor.	Very poor.	Poor	Poor	Very poor.
Cf----- Cape Fear	Very poor.	Poor	Poor	Poor	Poor	Good	Good	Poor	Poor	Good.
Ch----- Chewacla	Very poor.	Poor	Poor	Good	Good	Fair	Fair	Poor	Good	Fair.
Co----- Coxville	Poor	Fair	Fair	Fair	Fair	Good	Fair	Fair	Fair	Fair.
CrB----- Craven	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
CT----- Croatan	Very poor.	Poor	Poor	Poor	Poor	Good	Good	Poor	Poor	Good.
De----- Deloss	Very poor.	Very poor.	Very poor.	Fair	Fair	Good	Good	Very poor.	Fair	Good.
DgA----- Dogue	Good	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.
DhA----- Dothan	Good	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.

See footnote at end of table.

TABLE 9.--WILDLIFE HABITAT--Continued

Soil name and map symbol	Potential for habitat elements							Potential as habitat for--		
	Grain and seed crops	Grasses and legumes	Wild herba- ceous plants	Hardwood trees	Conif- erous plants	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife
Dn----- Dunbar	Good	Good	Good	Good	Good	Poor	Fair	Good	Good	Poor.
DpA----- Duplin	Good	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.
DT----- Dystrochrepts	Poor	Poor	Fair	Good	Poor	Very poor.	Very poor.	Very poor.	Good	Very poor.
ExA----- Exum	Good	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.
FaA----- Faceville	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
FaB----- Faceville	Good	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
FcB*: Faceville-----	Good	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
Urban land.										
FuB----- Fuquay	Fair	Fair	Good	Fair	Fair	Poor	Very poor.	Good	Fair	Very poor.
GdB----- Gilead	Fair	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
GdD----- Gilead	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
GoA----- Goldsboro	Good	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.
Gr----- Grantham	Poor	Fair	Fair	Fair	Fair	Good	Good	Fair	Fair	Good.
JT----- Johnston	Very poor.	Poor	Poor	Poor	Poor	Good	Good	Poor	Poor	Good.
KaA----- Kalmia	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
KeA----- Kenansville	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
KuB----- Kureb	Very poor.	Poor	Poor	Very poor.	Poor	Very poor.	Very poor.	Poor	Very poor.	Very poor.
LaB----- Lakeland	Poor	Fair	Fair	Poor	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.
LbB*: Lakeland-----	Poor	Fair	Fair	Poor	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.
Urban land.										
Ld----- Lenoir	Fair	Good	Good	Good	Good	Fair	Fair	Good	Good	Fair.
Le----- Leon	Poor	Fair	Good	Poor	Fair	Fair	Poor	Fair	Fair	Poor.

See footnote at end of table.

TABLE 9.--WILDLIFE HABITAT--Continued

Soil name and map symbol	Potential for habitat elements							Potential as habitat for--		
	Grain and seed crops	Grasses and legumes	Wild herba- ceous plants	Hardwood trees	Conif- erous plants	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife
Ly----- Lynchburg	Fair	Good	Good	Good	Good	Fair	Fair	Good	Good	Fair.
Mc----- McColl	Very poor	Poor	Very poor.	Poor	Very poor.	Good	Good	Very poor.	Poor	Good.
Na----- Nahunta	Fair	Good	Good	Good	Good	Fair	Fair	Good	Good	Fair.
NoA, NoB----- Norfolk	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
Pa----- Pactolus	Fair	Fair	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
Pg----- Pantego	Very poor.	Poor	Poor	Poor	Poor	Good	Fair	Poor	Poor	Fair.
Pt*: Pits.										
Tarboro-----	Poor	Fair	Fair	Poor	Poor	Very poor.	Very poor.	Fair	Poor	Very poor.
Ra----- Rains	Very poor.	Very poor.	Very poor.	Fair	Fair	Good	Good	Very poor.	Poor	Good.
Ro*: Roanoke-----	Poor	Poor	Fair	Fair	Fair	Good	Fair	Fair	Fair	Fair.
Wahee-----	Good	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.
Ru*: Roanoke-----	Poor	Poor	Fair	Fair	Fair	Good	Fair	Fair	Fair	Fair.
Urban land.										
St----- Stallings	Fair	Good	Good	Good	Good	Fair	Poor	Good	Good	Poor.
TaB----- Tarboro	Poor	Fair	Fair	Poor	Poor	Very poor.	Very poor.	Fair	Poor	Very poor.
TR*: Torhunta-----	Very poor.	Poor	Poor	Poor	Poor	Good	Good	Poor	Poor	Good.
Lynn Haven-----	Poor	Fair	Fair	Poor	Fair	Fair	Fair	Poor	Fair	Fair.
Ud. Udorthents										
Ur*. Urban land										
VaB----- Vaucluse	Fair	Fair	Fair	Fair	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.
VaD----- Vaucluse	Poor	Fair	Fair	Fair	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.
VgE*: Vaucluse-----	Poor	Fair	Fair	Fair	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.
Gilead-----	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.

See footnote at end of table.

TABLE 9.--WILDLIFE HABITAT--Continued

Soil name and map symbol	Potential for habitat elements							Potential as habitat for--		
	Grain and seed crops	Grasses and legumes	Wild herba- ceous plants	Hardwood trees	Conif- erous plants	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife
WaB----- Wagram	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
WgB*: Wagram-----	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
Urban land.										
WmB----- Wickham	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
WnB*: Wickham-----	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
Urban land.										
Wo----- Woodington	Poor	Fair	Fair	Fair	Fair	Good	Fair	Fair	Fair	Fair.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 10.--BUILDING SITE DEVELOPMENT

[Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe." Absence of an entry indicates that the soil was not rated. The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation]

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
AaA----- Altavista	Severe: wetness, cutbanks cave.	Severe: flooding.	Severe: flooding, wetness.	Severe: flooding.	Moderate: wetness, flooding.	Moderate: wetness.
AuA----- Autryville	Moderate: cutbanks cave.	Slight-----	Moderate: wetness.	Slight-----	Slight-----	Moderate: droughty.
AyB----- Aycock	Moderate: wetness.	Slight-----	Moderate: wetness.	Slight-----	Moderate: low strength.	Slight.
BaB----- Blaney	Moderate: dense layer.	Slight-----	Slight-----	Moderate: slope.	Slight-----	Severe: droughty.
BaD----- Blaney	Moderate: dense layer, slope.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope.	Severe: droughty.
BdB*: Blaney----- Urban land.	Moderate: dense layer.	Slight-----	Slight-----	Moderate: slope.	Slight-----	Severe: droughty.
BdD*: Blaney----- Urban land.	Moderate: dense layer, slope.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope.	Severe: droughty.
BrB----- Bragg	Slight-----	Slight-----	Slight-----	Slight-----	Slight-----	Slight.
BuA----- Butters	Moderate: wetness, cutbanks cave.	Slight-----	Moderate: wetness.	Slight-----	Slight-----	Moderate: droughty.
By----- Byars	Severe: ponding, wetness.	Severe: ponding, wetness.	Severe: ponding, wetness.	Severe: ponding, wetness.	Severe: low strength, ponding, wetness.	Severe: ponding, wetness.
CaB----- Candor	Severe: cutbanks cave.	Slight-----	Slight-----	Moderate: slope.	Slight-----	Moderate: droughty, too sandy.
CaD----- Candor	Severe: cutbanks cave.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope.	Moderate: droughty, too sandy.
Cf----- Cape Fear	Severe: wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: low strength, wetness.	Severe: wetness.
Ch----- Chewacla	Severe: wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: low strength, wetness, flooding.	Severe: wetness, flooding.
Co----- Coxville	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: low strength, wetness.	Severe: wetness.
CrB----- Craven	Severe: wetness.	Moderate: wetness, shrink-swell.	Severe: wetness.	Moderate: wetness, shrink-swell.	Severe: low strength.	Slight.

See footnote at end of table.

TABLE 10.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
CT----- Croatan	Severe: excess humus, wetness.	Severe: low strength, flooding, wetness.	Severe: low strength, flooding, wetness.	Severe: low strength, flooding, wetness.	Severe: wetness, low strength.	Severe: wetness, excess humus.
De----- Deloss	Severe: wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: wetness.	Severe: wetness.
DgA----- Dogue	Severe: cutbanks cave, wetness.	Severe: flooding.	Severe: flooding, wetness.	Severe: flooding.	Severe: low strength.	Moderate: wetness.
DhA----- Dothan	Moderate: wetness.	Slight-----	Moderate: wetness.	Slight-----	Slight-----	Moderate: droughty.
Dn----- Dunbar	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: low strength.	Moderate: wetness.
DpA----- Duplin	Severe: wetness.	Moderate: wetness, shrink-swell	Severe: wetness.	Moderate: wetness, shrink-swell.	Severe: low strength.	Slight.
DT. Dystrochrepts						
ExA----- Exum	Moderate: wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.	Moderate: low strength, wetness.	Slight.
FaA----- Faceville	Moderate: too clayey.	Slight-----	Slight-----	Slight-----	Moderate: low strength.	Slight.
FaB----- Faceville	Moderate: too clayey.	Slight-----	Slight-----	Moderate: slope.	Moderate: low strength.	Slight.
FcB*: Faceville	Moderate: too clayey.	Slight-----	Slight-----	Slight-----	Moderate: low strength.	Slight.
Urban land.						
FuB----- Fuquay	Slight-----	Slight-----	Moderate: wetness.	Slight-----	Slight-----	Moderate: droughty, too sandy.
GdB----- Gilead	Severe: wetness.	Moderate: wetness.	Severe: wetness.	Moderate: slope, wetness.	Severe: low strength.	Moderate: wetness.
GdD----- Gilead	Severe: wetness.	Moderate: slope.	Severe: wetness.	Severe: slope.	Severe: low strength.	Moderate: slope.
GoA----- Goldsboro	Severe: wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.	Moderate: wetness.	Slight.
Gr----- Grantham	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: low strength, wetness.	Severe: wetness.
JT----- Johnston	Severe: cutbanks cave, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.
KaA----- Kalmia	Severe: cutbanks cave.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Moderate: flooding.	Moderate: droughty.
KeA----- Kenansville	Severe: cutbanks cave.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Slight-----	Moderate: droughty.

See footnote at end of table.

TABLE 10.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
KuB----- Kureb	Severe: cutbanks cave.	Slight-----	Slight-----	Moderate: slope.	Slight-----	Severe: droughty.
LaB----- Lakeland	Severe: cutbanks cave.	Slight-----	Slight-----	Moderate: slope.	Slight-----	Moderate: droughty, too sandy.
LbB*: Lakeland----- Urban land.	Severe: cutbanks cave.	Slight-----	Slight-----	Moderate: slope.	Slight-----	Moderate: droughty, too sandy.
Ld----- Lenoir	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: low strength.	Moderate: wetness.
Le----- Leon	Severe: cutbanks cave, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness, droughty.
Ly----- Lynchburg	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
Mc----- McColl	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.
Na----- Nahunta	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: low strength.	Moderate: wetness.
NoA----- Norfolk	Moderate: wetness.	Slight-----	Moderate: wetness.	Slight-----	Slight-----	Slight.
NoB----- Norfolk	Moderate: wetness.	Slight-----	Moderate: wetness.	Moderate: slope.	Slight-----	Slight.
Pa----- Pactolus	Severe: cutbanks cave, wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness, slope.	Moderate: wetness.	Moderate: droughty.
Pg----- Pantego	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
Pt*: Pits. Tarboro-----	Severe: cutbanks cave.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Moderate: flooding.	Moderate: droughty.
Ra----- Rains	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
Ro*: Roanoke-----	Severe: wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: low strength, wetness.	Severe: wetness.
Wahee-----	Severe: wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: low strength, wetness.	Severe: wetness.
Ru*: Roanoke----- Urban land.	Severe: wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: low strength, wetness.	Severe: wetness.

See footnote at end of table.

TABLE 10.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
St----- Stallings	Severe: cutbanks cave, wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.	Moderate: wetness.	Moderate: wetness.
TaB----- Tarboro	Severe: cutbanks cave.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Moderate: flooding.	Moderate: droughty.
TR*: Torhunta-----	Severe: cutbanks cave, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
Lynn Haven-----	Severe: cutbanks cave, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness, droughty.
Ud. Udorthents						
Ur*. Urban land						
VaB----- Vaucluse	Severe: cutbanks cave.	Slight-----	Slight-----	Moderate: slope.	Slight-----	Moderate: droughty.
VaD----- Vaucluse	Severe: cutbanks cave.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope.	Moderate: droughty, slope.
VgE*: Vaucluse-----	Severe: cutbanks cave, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Gilead-----	Severe: wetness.	Severe: slope.	Severe: wetness.	Severe: slope.	Severe: low strength.	Severe: slope.
WaB----- Wagram	Slight-----	Slight-----	Slight-----	Slight-----	Slight-----	Moderate: droughty.
WgB*: Wagram-----	Slight-----	Slight-----	Slight-----	Moderate: slope.	Slight-----	Moderate: droughty.
Urban land.						
WmB----- Wickham	Slight-----	Severe: flooding.	Severe: flooding.	Severe: flooding.	Moderate: flooding.	Slight.
WnB*: Wickham-----	Slight-----	Severe: flooding.	Severe: flooding.	Severe: flooding.	Moderate: flooding.	Slight.
Urban land.						
Wo----- Woodington	Severe: cutbanks cave, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 11.--SANITARY FACILITIES

[Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," "good," "fair," and other terms. Absence of an entry indicates that the soil was not rated. The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation]

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
AaA----- Altavista	Severe: wetness.	Severe: flooding, wetness.	Severe: wetness.	Severe: seepage, wetness.	Fair: wetness.
AuA----- Autryville	Moderate: wetness.	Severe: seepage.	Slight-----	Severe: seepage.	Fair: too sandy.
AyB----- Aycock	Moderate: wetness, percs slowly.	Moderate: seepage, slope, wetness.	Moderate: too clayey.	Slight-----	Fair: too clayey.
BaB----- Blaney	Severe: percs slowly.	Severe: seepage.	Slight-----	Moderate: seepage.	Good.
BaD----- Blaney	Severe: percs slowly.	Severe: seepage, slope.	Moderate: slope.	Moderate: slope, seepage.	Fair: slope.
BdB*: Blaney----- Urban land.	Severe: percs slowly.	Severe: seepage.	Slight-----	Moderate: seepage.	Good.
BdD*: Blaney----- Urban land.	Severe: percs slowly.	Severe: seepage, slope.	Moderate: slope.	Moderate: slope, seepage.	Fair: slope.
BrB----- Bragg	Severe: percs slowly.	Moderate: slope.	Severe: seepage.	Slight-----	Good.
BuA----- Butters	Moderate: wetness.	Severe: seepage.	Severe: wetness.	Severe: seepage.	Fair: too sandy.
By----- Byars	Severe: ponding, percs slowly, wetness.	Severe: ponding, wetness.	Severe: ponding, wetness.	Severe: ponding, wetness.	Poor: ponding, wetness.
CaB----- Candor	Slight-----	Severe: seepage.	Severe: too sandy.	Severe: seepage.	Poor: too sandy,
CaD----- Candor	Moderate: slope.	Severe: seepage, slope.	Severe: too sandy.	Severe: seepage.	Poor: too sandy, seepage.
Cf----- Cape Fear	Severe: wetness, percs slowly.	Severe: seepage, flooding, wetness.	Severe: wetness, too clayey.	Severe: seepage, wetness.	Poor: too clayey, hard to pack, wetness.
Ch----- Chewacla	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Poor: wetness.
Co----- Coxville	Severe: wetness, percs slowly.	Slight-----	Severe: wetness, too clayey.	Severe: wetness.	Poor: wetness.

See footnote at end of table.

TABLE 11.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
CrB----- Craven	Severe: wetness, percs slowly.	Moderate: slope.	Severe: wetness, too clayey.	Severe: wetness.	Poor: too clayey, hard to pack.
CT----- Croatan	Severe: wetness, percs slowly.	Severe: flooding, excess humus, wetness.	Severe: wetness.	Severe: wetness.	Poor: wetness.
De----- Deloss	Severe: wetness.	Severe: seepage, flooding, wetness.	Severe: wetness.	Severe: wetness.	Poor: wetness.
DgA----- Dogue	Severe: wetness, percs slowly.	Severe: seepage, wetness.	Severe: seepage, wetness, too clayey.	Severe: wetness.	Poor: too clayey, hard to pack.
DhA----- Dothan	Severe: wetness, percs slowly.	Moderate: seepage.	Moderate: wetness.	Slight-----	Good.
Dn----- Dunbar	Severe: wetness, percs slowly.	Slight-----	Severe: wetness, too clayey.	Severe: wetness.	Poor: wetness.
DpA----- Duplin	Severe: wetness, percs slowly.	Slight-----	Severe: wetness.	Severe: wetness.	Fair: too clayey, hard to pack, wetness.
DT. Dystrochrepts					
ExA----- Exum	Severe: wetness.	Slight-----	Severe: wetness.	Severe: wetness.	Fair: too clayey, wetness.
FaA----- Faceville	Slight-----	Moderate: seepage.	Moderate: too clayey.	Slight-----	Fair: too clayey.
FaB----- Faceville	Slight-----	Moderate: seepage, slope.	Moderate: too clayey.	Slight-----	Fair: too clayey.
FcB*: Faceville-----	Slight-----	Moderate: seepage, slope.	Moderate: too clayey.	Slight-----	Fair: too clayey.
Urban land.					
FuB----- Fuquay	Moderate: percs slowly.	Moderate: slope.	Slight-----	Slight-----	Poor: too sandy.
GdB----- Gilead	Severe: wetness, percs slowly.	Moderate: slope.	Severe: wetness.	Moderate: wetness.	Fair: too clayey, wetness.
GdD----- Gilead	Severe: wetness, percs slowly.	Severe: slope.	Severe: wetness.	Moderate: slope.	Fair: slope, too clayey, wetness.
GoA----- Goldsboro	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Fair: wetness.

See footnote at end of table.

TABLE 11.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
Gr----- Grantham	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness.	Severe: seepage, wetness.	Poor: wetness.
JT----- Johnston	Severe: flooding, wetness, poor filter.	Severe: seepage, flooding, wetness.	Severe: flooding, seepage, wetness.	Severe: flooding, seepage, wetness.	Poor: seepage, wetness.
KaA----- Kalmia	Slight-----	Severe: seepage, flooding.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage.
KeA----- Kenansville	Slight-----	Slight-----	Severe: seepage.	Severe: seepage.	Poor: seepage.
KuB----- Kureb	Severe: poor filter.	Severe: seepage.	Severe: too sandy.	Severe: seepage.	Poor: seepage, too sandy.
LaB----- Lakeland	Severe: poor filter.	Severe: seepage.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy.
LbB*: Lakeland-----	Severe: poor filter.	Severe: seepage.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy.
Urban land.					
Ld----- Lenoir	Severe: wetness, percs slowly.	Slight-----	Severe: wetness, too clayey.	Severe: wetness.	Poor: too clayey, hard to pack, wetness.
Le----- Leon	Severe: wetness, poor filter.	Severe: seepage, wetness.	Severe: seepage, wetness, too sandy.	Severe: seepage, wetness.	Poor: seepage, too sandy, wetness.
Ly----- Lynchburg	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Poor: wetness.
Mc----- McColl	Severe: ponding, percs slowly.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Poor: ponding.
Na----- Nahunta	Severe: wetness.	Slight-----	Severe: wetness.	Severe: wetness.	Poor: wetness.
NoA, NoB----- Norfolk	Moderate: wetness.	Moderate: seepage.	Slight-----	Slight-----	Slight.
Pa----- Pactolus	Severe: wetness, poor filter.	Severe: seepage, wetness.	Severe: seepage, wetness.	Severe: seepage, wetness.	Fair: too sandy, wetness.
Pg----- Pantego	Severe: wetness.	Severe: seepage, wetness.	Severe: wetness.	Severe: wetness.	Poor: wetness.
Pt*: Pits.					

See footnote at end of table.

TABLE 11.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
Pt*: Tarboro-----	Severe: poor filter.	Severe: seepage, flooding, slope.	Severe: seepage.	Severe: seepage.	Poor: seepage.
Ra----- Rains	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Poor: wetness.
Ro*: Roanoke-----	Severe: wetness, percs slowly.	Severe: seepage, flooding, wetness.	Severe: wetness, too clayey.	Severe: wetness.	Poor: hard to pack, too clayey, wetness.
Wahee-----	Severe: wetness, percs slowly.	Severe: flooding, wetness.	Severe: wetness, too clayey.	Severe: wetness.	Poor: too clayey, hard to pack, wetness.
Ru*: Roanoke-----	Severe: wetness, percs slowly.	Severe: seepage, flooding, wetness.	Severe: wetness, too clayey.	Severe: wetness.	Poor: hard to pack, too clayey, wetness.
Urban land.					
St----- Stallings	Severe: wetness, poor filter.	Severe: seepage, wetness.	Severe: seepage, wetness.	Severe: seepage, wetness.	Poor: thin layer.
TaB----- Tarboro	Severe: poor filter.	Severe: seepage, flooding.	Severe: seepage.	Severe: seepage.	Poor: seepage.
TR*: Torhunta-----	Severe: wetness, poor filter.	Severe: seepage, wetness.	Severe: seepage, wetness.	Severe: seepage, wetness.	Poor: wetness.
Lynn Haven-----	Severe: wetness, poor filter.	Severe: seepage, wetness.	Severe: seepage, wetness, too sandy.	Severe: seepage, wetness.	Poor: seepage, too sandy, wetness.
Ud. Udorthents					
Ur*. Urban land					
VaB----- Vaucluse	Severe: percs slowly.	Severe: seepage.	Severe: seepage.	Severe: seepage.	Fair: too clayey.
VaD----- Vaucluse	Severe: percs slowly.	Severe: seepage, slope.	Severe: seepage.	Severe: seepage.	Fair: too clayey, slope.
VgE*: Vaucluse-----	Severe: percs slowly, slope.	Severe: seepage, slope.	Severe: seepage, slope.	Severe: seepage, slope.	Poor: slope.
Gilead-----	Severe: wetness, percs slowly.	Severe: slope.	Severe: wetness.	Moderate: slope.	Fair: slope, too clayey, wetness.

See footnote at end of table.

TABLE 11.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
WaB----- Wagram	Slight-----	Moderate: seepage.	Slight-----	Slight-----	Good.
WgB*: Wagram-----	Slight-----	Moderate: seepage.	Slight-----	Slight-----	Good.
Urban land.					
WmB----- Wickham	Moderate: flooding.	Severe: flooding.	Severe: seepage.	Moderate: flooding.	Fair: thin layer.
WnB*: Wickham-----	Moderate: flooding.	Severe: flooding.	Severe: seepage.	Moderate: flooding.	Fair: thin layer.
Urban land.					
Wo----- Woodington	Severe: wetness.	Severe: seepage, wetness.	Severe: seepage, wetness.	Severe: seepage, wetness.	Poor: wetness.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 12.--CONSTRUCTION MATERIALS

[Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "good," "fair," "poor," "probable," and "improbable." Absence of an entry indicates that the soil was not rated. The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation]

Soil name and map symbol	Roadfill	Sand	Topsoil
AaA----- Altavista	Fair: wetness, thin layer.	Improbable: excess fines.	Good.
AuA----- Autryville	Good-----	Improbable: thin layer.	Fair: too sandy.
AyB----- Aycock	Fair: low strength.	Improbable: excess fines.	Fair: too clayey.
BaB, BaD----- Blaney	Good-----	Improbable: excess fines.	Fair: too sandy.
BdB*, BdD*: Blaney-----	Good-----	Improbable: excess fines.	Fair: too sandy.
Urban land.			
BrB----- Bragg	Good-----	Improbable: excess fines.	Poor: thin layer.
BuA----- Butters	Good-----	Improbable: excess fines.	Fair: too sandy.
By----- Byars	Poor: low strength, wetness.	Improbable: excess fines.	Poor: thin layer, wetness.
CaB, CaD----- Candor	Good-----	Probable-----	Poor: too sandy.
Cf----- Cape Fear	Poor: low strength, wetness.	Improbable: excess fines.	Poor: thin layer, wetness.
Ch----- Chewacla	Poor: low strength, wetness.	Improbable: excess fines.	Poor: wetness.
Co----- Coxville	Poor: wetness, low strength.	Improbable: excess fines.	Poor: thin layer, wetness.
CrB----- Craven	Poor: low strength.	Improbable: excess fines.	Poor: thin layer.
CT----- Croatan	Poor: wetness, low strength.	Improbable: excess fines.	Poor: excess humus, wetness.
De----- Deloss	Poor: wetness.	Improbable: excess fines.	Poor: wetness.
DgA----- Dogue	Fair: wetness.	Probable-----	Poor: thin layer.
DhA----- Dothan	Good-----	Improbable: excess fines.	Fair: too sandy, thin layer.

See footnote at end of table.

TABLE 12.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Topsoil
Dn----- Dunbar	Poor: low strength.	Improbable: excess fines.	Poor: thin layer.
DpA----- Duplin	Poor: low strength.	Improbable: excess fines.	Poor: thin layer.
DT. Dystrochrepts			
ExA----- Exum	Fair: wetness.	Improbable: excess fines.	Good.
FaA, FaB----- Faceville	Fair: low strength.	Improbable: excess fines.	Poor: thin layer.
FcB*: Faceville-----	Fair: low strength.	Improbable: excess fines.	Poor: thin layer.
Urban land.			
FuB----- Fuquay	Good-----	Improbable: excess fines.	Poor: too sandy.
GdB, GdD----- Gilead	Fair: wetness.	Improbable: excess fines.	Poor: too clayey, thin layer.
GoA----- Goldsboro	Fair: wetness.	Improbable: excess fines.	Fair: too sandy.
Gr----- Grantham	Poor: low strength, wetness.	Improbable: excess fines.	Poor: wetness.
JT----- Johnston	Poor: wetness.	Improbable: excess fines.	Poor: wetness.
KaA----- Kalmia	Good-----	Probable-----	Fair: too sandy, thin layer.
KeA----- Kenansville	Good-----	Probable-----	Fair: too sandy.
KuB----- Kureb	Good-----	Probable-----	Poor: too sandy.
LaB----- Lakeland	Good-----	Probable-----	Poor: too sandy.
LbB*: Lakeland-----	Good-----	Probable-----	Poor: too sandy.
Urban land.			
Ld----- Lenoir	Poor: low strength.	Improbable: excess fines.	Poor: thin layer.
Le----- Leon	Poor: wetness.	Probable-----	Poor: too sandy, wetness.
Ly----- Lynchburg	Poor: wetness.	Improbable: excess fines.	Poor: wetness.

See footnote at end of table.

TABLE 12.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Topsoil
Mc----- McColl	Poor: wetness.	Improbable: excess fines.	Poor: area reclaim, wetness.
Na----- Nahunta	Poor: low strength.	Improbable: excess fines.	Good.
NoA, NoB----- Norfolk	Good-----	Improbable: excess fines.	Fair: too sandy.
Pa----- Pactolus	Fair: wetness.	Probable-----	Fair: too sandy.
Pg----- Pantego	Poor: wetness.	Improbable: excess fines.	Poor: wetness.
Pt*: Pits.			
Tarboro-----	Good-----	Probable-----	Fair: too sandy.
Ra----- Rains	Poor: wetness.	Improbable: excess fines.	Poor: wetness.
Ro*: Roanoke-----	Poor: low strength, wetness.	Improbable: excess fines.	Poor: thin layer, wetness.
Wahee-----	Poor: low strength, wetness.	Improbable: excess fines.	Poor: thin layer, wetness.
Ru*: Roanoke-----	Poor: low strength, wetness.	Improbable: excess fines.	Poor: thin layer, wetness.
Urban land.			
St----- Stallings	Fair: wetness.	Probable-----	Fair: too sandy.
TaB----- Tarboro	Good-----	Probable-----	Fair: too sandy.
TR*: Torhunta-----	Poor: wetness.	Probable-----	Poor: wetness.
Lynn Haven-----	Poor: wetness.	Probable-----	Poor: too sandy, wetness.
Ud. Udorthents			
Ur*. Urban land			
VaB, VaD----- Vaucluse	Good-----	Improbable: excess fines.	Fair: area reclaim, too sandy, small stones.

See footnote at end of table.

TABLE 12.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Topsoil
VgE*: Vaucluse-----	Fair: slope.	Improbable: excess fines.	Fair: area reclaim, too sandy, small stones.
Gilead-----	Fair: wetness.	Improbable: excess fines.	Poor: too clayey, thin layer.
WaB----- Wagram	Good-----	Improbable: excess fines.	Fair: too sandy.
WgB*: Wagram-----	Good-----	Improbable: excess fines.	Fair: too sandy.
Urban land.			
WmB----- Wickham	Fair: thin layer.	Improbable: excess fines.	Good.
WnB*: Wickham-----	Fair: thin layer.	Improbable: excess fines.	Good.
Urban land.			
Wo----- Woodington	Poor: wetness.	Probable-----	Poor: wetness.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 13.--WATER MANAGEMENT

[Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe." Absence of an entry indicates that the soil was not evaluated. The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation]

Soil name and map symbol	Limitations for--			Features affecting--		
	Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Drainage	Terraces and diversions	Grassed waterways
AaA----- Altavista	Moderate: seepage.	Moderate: wetness.	Moderate: deep to water.	Favorable-----	Wetness-----	Favorable.
AuA----- Autryville	Severe: seepage.	Severe: seepage, piping.	Severe: no water.	Deep to water	Too sandy-----	Droughty.
AyB----- Aycock	Moderate: seepage.	Moderate: piping.	Moderate: deep to water, slow refill.	Deep to water	Erodes easily	Erodes easily.
BaB----- Blaney	Moderate: seepage.	Severe: piping.	Severe: no water.	Deep to water	Soil blowing---	Droughty, rooting depth.
BaD----- Blaney	Moderate: seepage.	Severe: piping.	Severe: no water.	Deep to water	Slope, soil blowing.	Slope, droughty, rooting depth.
BdB*: Blaney-----	Moderate: seepage.	Severe: piping.	Severe: no water.	Deep to water	Soil blowing---	Droughty, rooting depth.
Urban land.						
BdD*: Blaney-----	Moderate: seepage.	Severe: piping.	Severe: no water.	Deep to water	Slope, soil blowing.	Slope, droughty, rooting depth.
Urban land.						
BrB----- Bragg	Slight-----	Moderate: piping.	Severe: no water.	Deep to water	Percs slowly---	Percs slowly.
BuA----- Butters	Severe: seepage.	Severe: seepage, piping.	Severe: cutbanks cave.	Deep to water	Too sandy-----	Droughty.
By----- Byars	Slight-----	Severe: hard to pack, wetness.	Severe: slow refill.	Ponding, percs slowly.	Ponding, percs slowly.	Wetness, percs slowly.
CaB----- Candor	Severe: seepage.	Severe: seepage, piping.	Severe: no water.	Deep to water	Too sandy, soil blowing.	Droughty.
CaD----- Candor	Severe: seepage.	Severe: seepage, piping.	Severe: no water.	Deep to water	Slope, too sandy, soil blowing.	Slope, droughty.
Cf----- Cape Fear	Slight-----	Severe: hard to pack, wetness.	Slight-----	Percs slowly---	Wetness, percs slowly.	Wetness, percs slowly.
Ch----- Chewacla	Moderate: seepage.	Severe: piping, wetness.	Moderate: slow refill.	Flooding-----	Wetness-----	Wetness.
Co----- Coxville	Slight-----	Severe: wetness.	Severe: slow refill.	Favorable-----	Wetness-----	Wetness.
CrB----- Craven	Slight-----	Moderate: hard to pack, wetness.	Severe: slow refill.	Percs slowly---	Erodes easily, wetness.	Erodes easily, percs slowly.

See footnote at end of table.

TABLE 13.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for--			Features affecting--		
	Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Drainage	Terraces and diversions	Grassed waterways
CT----- Croatan	Slight-----	Severe: wetness.	Slight-----	Percs slowly, subsides.	Wetness, percs slowly.	Wetness, percs slowly.
De----- Deloss	Moderate: seepage.	Severe: piping, wetness.	Moderate: slow refill.	Favorable-----	Wetness-----	Wetness.
DgA----- Dogue	Moderate: seepage.	Severe: wetness.	Severe: slow refill, cutbanks cave.	Favorable-----	Wetness.	Favorable.
DhA----- Dothan	Moderate: seepage.	Slight-----	Severe: no water.	Deep to water	Favorable-----	Favorable.
Dn----- Dunbar	Slight-----	Severe: wetness.	Severe: slow refill.	Favorable-----	Wetness-----	Wetness.
DpA----- Duplin	Slight-----	Moderate: piping, hard to pack, wetness.	Severe: slow refill.	Favorable-----	Wetness-----	Favorable.
DT. Dystrochrepts						
ExA----- Exum	Moderate: seepage.	Moderate: piping, wetness.	Moderate: deep to water.	Favorable-----	Erodes easily, wetness.	Erodes easily.
FaA, FaB----- Faceville	Moderate: seepage.	Slight-----	Severe: no water.	Deep to water	Favorable-----	Favorable.
FcB*: Faceville-----	Moderate: seepage.	Slight-----	Severe: no water.	Deep to water	Favorable-----	Favorable.
Urban land.						
FuB----- Fuquay	Slight-----	Slight-----	Severe: no water.	Deep to water	Too sandy-----	Droughty.
GdB----- Gilead	Moderate: slope.	Moderate: wetness.	Severe: no water.	Percs slowly, slope.	Percs slowly, wetness.	Percs slowly.
GdD----- Gilead	Severe: slope.	Moderate: wetness.	Severe: no water.	Percs slowly, slope.	Slope, percs slowly.	Slope, percs slowly.
GoA----- Goldsboro	Moderate: seepage.	Moderate: wetness.	Moderate: deep to water.	Favorable-----	Wetness-----	Favorable.
Gr----- Grantham	Slight-----	Severe: wetness.	Moderate: slow refill.	Favorable-----	Erodes easily, wetness.	Wetness, erodes easily.
JT----- Johnston	Severe: seepage.	Severe: seepage, piping, wetness.	Severe: cutbanks cave.	Flooding, cutbanks cave.	Wetness-----	Wetness.
KaA----- Kalmia	Severe: seepage.	Slight-----	Severe: no water.	Deep to water	Too sandy-----	Droughty.
KeA----- Kenansville	Severe: seepage.	Severe: seepage, piping.	Severe: no water.	Deep to water	Too sandy-----	Droughty.
KuB----- Kureb	Severe: seepage.	Severe: seepage, piping.	Severe: no water.	Deep to water	Too sandy-----	Droughty.
LaB----- Lakeland	Severe: seepage.	Severe: seepage.	Severe: no water.	Deep to water	Too sandy, soil blowing.	Droughty.

See footnote at end of table.

TABLE 13.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for--			Features affecting--		
	Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Drainage	Terraces and diversions	Grassed waterways
LbB*: Lakeland----- Urban land.	Severe: seepage.	Severe: seepage.	Severe: no water.	Deep to water	Too sandy, soil blowing.	Droughty.
Ld----- Lenoir	Slight-----	Severe: wetness.	Severe: slow refill.	Peres slowly---	Erodes easily, wetness, peres slowly.	Wetness, erodes easily, peres slowly.
Le----- Leon	Severe: seepage.	Severe: seepage, piping, wetness.	Severe: cutbanks cave.	Cutbanks cave	Wetness, too sandy, soil blowing.	Wetness, droughty.
Ly----- Lynchburg	Moderate: seepage.	Severe: piping, wetness.	Moderate: slow refill.	Favorable-----	Wetness-----	Wetness.
Mc----- McColl	Moderate: seepage.	Severe: piping, ponding.	Severe: slow refill.	Ponding, peres slowly.	Ponding, rooting depth.	Wetness, rooting depth.
Na----- Nahunta	Slight-----	Severe: wetness.	Moderate: slow refill.	Favorable-----	Erodes easily, wetness.	Wetness, erodes easily.
NoA, NoB----- Norfolk	Moderate: seepage.	Slight-----	Severe: deep to water.	Deep to water	Favorable-----	Favorable.
Pa----- Pactolus	Severe: seepage.	Severe: seepage, piping.	Severe: cutbanks cave.	Slope, cutbanks cave.	Wetness, too sandy.	Droughty.
Pg----- Pantego	Moderate: seepage.	Severe: wetness.	Moderate: slow refill.	Favorable-----	Wetness-----	Wetness.
Pt*: Pits.						
Tarboro-----	Severe: seepage.	Severe: seepage, piping.	Severe: no water.	Deep to water	Too sandy-----	Droughty.
Ra----- Rains	Moderate: seepage.	Severe: piping, wetness.	Moderate: slow refill.	Favorable-----	Wetness, soil blowing.	Wetness.
Ro*: Roanoke-----	Moderate: seepage.	Severe: wetness.	Severe: slow refill.	Peres slowly---	Erodes easily, wetness, peres slowly.	Wetness, erodes easily, peres slowly.
Wahee-----	Slight-----	Severe: wetness.	Severe: slow refill.	Peres slowly, slope.	Wetness, peres slowly.	Wetness, peres slowly.
Ru*: Roanoke----- Urban land.	Moderate: seepage.	Severe: wetness.	Severe: slow refill.	Peres slowly---	Erodes easily, wetness, peres slowly.	Wetness, erodes easily, peres slowly.
St----- Stallings	Severe: seepage.	Severe: piping, wetness.	Severe: cutbanks cave.	Cutbanks cave	Wetness-----	Wetness.
TaB----- Tarboro	Severe: seepage.	Severe: seepage, piping.	Severe: no water.	Deep to water	Too sandy-----	Droughty.

See footnote at end of table.

TABLE 13.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for--			Features affecting--		
	Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Drainage	Terraces and diversions	Grassed waterways
TR*: Torhunta-----	Severe: seepage.	Severe: piping, wetness.	Severe: cutbanks cave.	Cutbanks cave	Wetness-----	Wetness.
Lynn Haven-----	Severe: seepage.	Severe: seepage, piping, wetness.	Severe: cutbanks cave.	Cutbanks cave	Wetness, too sandy, soil blowing.	Wetness, droughty.
Ud. Udorthents						
Ur*. Urban land						
VaB----- Vaucluse	Severe: seepage.	Severe: piping.	Severe: no water.	Deep to water	Percs slowly.	Droughty, rooting depth.
VaD----- Vaucluse	Severe: seepage, slope.	Severe: piping.	Severe: no water.	Deep to water	Slope, percs slowly.	Slope, droughty, rooting depth.
VgE*: Vaucluse-----	Severe: seepage, slope.	Severe: piping.	Severe: no water.	Deep to water	Slope, soil blowing, percs slowly.	Slope, droughty, rooting depth.
Gilead-----	Severe: slope.	Moderate: wetness.	Severe: no water.	Percs slowly, slope.	Slope, percs slowly.	Slope, percs slowly.
WaB----- Wagram	Moderate: seepage.	Slight-----	Severe: no water.	Deep to water	Favorable-----	Droughty.
WgB*: Wagram-----	Moderate: seepage.	Slight-----	Severe: no water.	Deep to water	Favorable-----	Droughty.
Urban land.						
WmB----- Wickham	Moderate: seepage.	Moderate: thin layer.	Severe: no water.	Deep to water	Favorable-----	Favorable.
WnB*: Wickham-----	Moderate: seepage.	Moderate: thin layer.	Severe: no water.	Deep to water	Favorable-----	Favorable.
Urban land.						
Wo----- Woodington	Severe: seepage.	Severe: piping, wetness.	Severe: cutbanks cave.	Cutbanks cave	Wetness-----	Wetness.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 14.--ENGINEERING INDEX PROPERTIES

[The symbol < means less than; > means more than. Absence of an entry indicates that data were not estimated]

Soil name and map symbol	Depth	USDA texture	Classification		Frag-ments > 3 inches	Percentage passing sieve number--				Liquid limit	Plas-ticity index
			Unified	AASHTO		4	10	40	200		
	<u>In</u>				<u>Pct</u>					<u>Pct</u>	
AaA----- Altavista	0-11	Fine sandy loam	ML, CL-ML, SM, SM-SC	A-4	0	95-100	90-100	65-99	35-60	<23	*NP-7
	11-37	Clay loam, sandy clay loam, loam.	CL, CL-ML, SC, SM-SC	A-4, A-6, A-7	0	95-100	95-100	60-99	45-75	20-45	5-28
	37-80	Variable-----	---	---	0	---	---	---	---	---	---
AuA----- Autryville	0-25	Loamy sand-----	SP-SM, SM	A-2, A-3	0	100	100	50-100	5-20	---	NP
	25-39	Sandy loam, sandy clay loam, fine sandy loam.	SM	A-2	0	100	100	50-100	15-30	<25	NP-3
	39-59	Sand, loamy sand, loamy fine sand.	SP-SM, SM	A-2, A-3	0	100	100	50-100	5-20	---	NP
	59-80	Sandy loam, sandy clay loam, fine sandy loam.	SM, SC, SM-SC	A-2, A-4	0	100	100	60-100	20-49	<30	NP-10
AyB----- Aycock	0-13	Loam-----	ML, CL-ML, CL	A-4	0	100	95-100	80-100	51-80	<25	NP-10
	13-80	Clay loam, silty clay loam, loam.	CL	A-4, A-6, A-7	0	100	95-100	90-100	60-90	22-49	8-30
BaB, BaD----- Blaney	0-25	Loamy sand-----	SM, SP-SM	A-2, A-3	0	98-100	95-100	60-85	8-30	---	NP
	25-34	Sandy clay loam, sandy loam.	SM, SC, SM-SC	A-2, A-4, A-6, A-1-B	0	98-100	90-100	25-85	20-50	<40	NP-20
	34-80	Sandy loam, sandy clay loam, loamy coarse sand.	SM, SC, SM-SC	A-2, A-4, A-6, A-1-B	0	95-100	90-100	24-85	15-50	<35	NP-12
BdB**, BdD**: Blaney-----	0-25	Loamy sand-----	SM, SP-SM	A-2, A-3	0	98-100	95-100	60-85	8-30	---	NP
	25-34	Sandy clay loam, sandy loam.	SM, SC, SM-SC	A-2, A-4, A-6, A-1-B	0	98-100	90-100	25-85	20-50	<40	NP-20
	34-80	Sandy loam, sandy clay loam, loamy coarse sand.	SM, SC, SM-SC	A-2, A-4, A-6, A-1-B	0	95-100	90-100	24-85	15-50	<35	NP-12
Urban land.											
BrB----- Bragg	0-6	Sandy loam-----	SM	A-2, A-4	0-3	98-100	95-100	50-80	13-40	<20	NP-4
	6-30	Stratified sandy loam to clay loam.	SM, SM-SC, SC, CL	A-2, A-4, A-6, A-7-6	0-3	95-100	90-100	50-95	25-65	15-49	3-25
	30-80	Sandy loam, sandy clay loam, sandy clay.	SM, SC, ML, CL	A-4, A-6	0-3	95-100	95-100	60-95	39-60	15-40	3-18
BuA----- Butters	0-9	Loamy sand-----	SP-SM, SM	A-2, A-3	0	100	95-100	50-75	5-25	---	NP
	9-37	Sandy loam, fine sandy loam.	SM, SM-SC	A-2, A-4	0	100	95-100	60-85	20-40	<30	NP-7
	37-58	Loamy sand, loamy fine sand, sand.	SP, SP-SM, SM	A-2, A-3	0	100	95-100	50-75	3-20	---	NP
	58-80	Sandy loam, sandy clay loam.	SM, SM-SC, SC	A-2, A-4, A-6	0	100	95-100	60-85	25-49	15-35	3-15
By----- Byars	0-18	Loam-----	CL, ML	A-6, A-7-6	0	98-100	98-100	90-100	70-95	32-50	11-23
	18-80	Clay, clay loam, sandy clay.	CL, CH, MH	A-7-5, A-7-6, A-6	0	98-100	98-100	90-100	60-95	39-75	17-42

See footnote at end of table.

TABLE 14.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag- ments > 3 inches	Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO		4	10	40	200		
	<u>In</u>				<u>Pct</u>					<u>Pct</u>	
CaB, CaD Candor	0-20	Sand-----	SP-SM, SM	A-3, A-2-4	0-2	100	100	55-90	5-15	---	NP
	20-30	Loamy sand-----	SM, SP-SM	A-2-4	0-2	100	100	65-90	10-25	---	NP
	30-60	Sand-----	SP-SM, SM	A-3, A-2-4	0-7	90-100	90-100	55-90	5-15	---	---
	60-80	Sandy clay loam, sandy loam, sandy clay.	SC, SM-SC, SM	A-4, A-2, A-7-6	0-7	90-100	90-100	55-90	25-49	<45	NP-25
Cf----- Cape Fear	0-16	Loam-----	ML, CL-ML, CL	A-4, A-6	0	100	95-100	85-100	60-90	20-40	3-15
	16-52	Clay loam, clay, silty clay.	ML, CL, MH, CH	A-7	0	100	95-100	90-100	60-85	41-65	15-35
	52-62	Variable-----	---	---	---	---	---	---	---	---	---
Ch----- Chewacla	0-25	Loam-----	ML, CL, CL-ML	A-4, A-6	0	98-100	95-100	70-100	55-90	25-40	NP-20
	25-64	Sandy clay loam, clay loam, loam.	SM CL, SC, ML	A-4, A-6	0	96-100	95-100	60-80	36-70	<35	NP-28
Co----- Coxville	0-7	Loam-----	SM, ML, CL-ML, CL	A-4, A-6, A-7	0	100	100	85-97	46-75	20-46	3-15
	7-55	Clay loam, sandy clay, clay.	CL, CH	A-6, A-7	0	100	100	85-98	50-85	30-55	12-35
	55-72	Variable-----	---	---	---	---	---	---	---	---	---
CrE----- Craven	0-7	Loam-----	ML, CL-ML, SM, SM-SC	A-4	0	100	100	75-100	45-90	<35	NP-7
	7-58	Clay, silty clay, silty clay loam.	CH	A-7	0	100	100	90-100	65-98	51-70	24-43
	58-80	Sandy clay loam, sandy loam, clay loam.	SM, SM-SC, SC	A-2, A-4, A-6	0	100	95-100	50-100	15-49	<35	NP-15
CT----- Croatan	0-37	Muck	PT	---	---	---	---	---	---	---	---
	37-80	Sandy loam, fine sandy loam, mucky sandy loam.	SM, SC, SM-SC	A-2, A-4	0	100	100	60-85	25-49	<30	NP-10
De----- Deioss	0-13	Loam-----	SM, SM-SC, ML, CL-ML	A-2, A-4	0	100	100	70-95	30-65	<35	NP-7
	13-48	Sandy clay loam, clay loam, fine sandy loam.	SM-SC, SC, CL-ML, CL	A-4, A-6, A-7	0	100	100	75-98	36-70	18-45	4-22
	48-72	Variable-----	---	---	---	---	---	---	---	---	---
DgA----- Dogue	0-4	Fine sandy loam	SM, SC, SM-SC	A-2, A-4	0	95-100	75-100	50-100	20-50	<25	NP-10
	4-55	Clay loam, clay, sandy clay loam.	CL, CH, SC	A-6, A-7	0	95-100	75-100	65-100	40-90	35-60	16-40
	55-72	Stratified sand to sandy clay loam.	SM, SC, SP-SM, SM-SC	A-2, A-4, A-1	0	80-100	60-100	35-100	10-40	<30	NP-10
DhA----- Dothan	0-11	Loamy sand-----	SM	A-2	0	95-100	92-100	60-80	13-30	---	NP
	11-38	Sandy clay loam, sandy loam.	SM-SC, SC, SM	A-2, A-4, A-6	0	95-100	92-100	68-90	23-49	<40	NP-16
	38-72	Sandy clay loam, sandy clay.	SM-SC, SC, SM, CL	A-2, A-4, A-6, A-7	0	95-100	92-100	70-95	30-53	25-45	4-23
Dn----- Dunbar	0-10	Loam-----	SM, SM-SC	A-2, A-4	0	100	100	50-95	20-50	<30	NP-7
	10-72	Sandy clay, clay loam, clay.	CL, CH	A-6, A-7	0	100	100	85-95	50-70	36-60	18-35
DpA----- Duplin	0-6	Sandy loam-----	SM, SM-SC	A-2, A-4	0	100	100	67-98	20-49	<26	NP-7
	6-65	Sandy clay, clay loam, clay.	CL, CH, SC	A-6, A-7	0	100	98-100	80-100	45-75	24-54	13-35

See footnote at end of table.

TABLE 14.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag-ments > 3 inches Pct	Percentage passing sieve number--				Liquid limit Pct	Plas- ticity index
			Unified	AASHTO		4	10	40	200		
DT. Dystrochrepts	<u>In</u>										
ExA----- Exum	0-12	Loam-----	ML, CL-ML, CL	A-4	0	100	95-100	80-100	51-80	<25	NP-10
	12-75	Loam, clay loam, silty clay loam.	CL	A-4, A-6, A-7	0	100	95-100	90-100	60-90	22-49	8-30
FaA, FaB----- Faceville	0-17	Loamy sand-----	SM	A-2	0	90-100	85-100	72-97	13-25	---	NP
	17-70	Sandy clay loam, sandy clay.	SC, ML, CL, SM	A-4, A-6	0	98-100	90-100	85-98	46-66	<35	NP-13
FcB**: Faceville-----	0-17	Loamy sand-----	SM	A-2	0	90-100	85-100	72-97	13-25	---	NP
	17-70	Sandy clay loam, sandy clay.	SC, ML, CL, SM	A-4, A-6	0	98-100	90-100	85-98	46-66	<35	NP-13
Urban land.											
FuB----- Fuquay	0-29	Sand-----	SP-SM, SM	A-1, A-2, A-3	0	95-100	90-100	45-80	5-20	---	NP
	29-42	Sandy loam, sandy clay loam.	SM, SC, SM-SC	A-2, A-4, A-6	0	85-100	85-100	70-90	23-45	<25	NP-13
	42-80	Sandy clay loam	SC	A-2, A-4, A-6, A-7-6	0	95-100	90-100	60-93	28-49	20-49	8-25
GdB, GdD----- Gilead	0-13	Loamy sand-----	SP-SM, SM	A-2	0-5	90-100	75-100	55-85	10-35	---	NP
	13-32	Sandy clay, clay loam, clay.	SC, CL	A-6, A-7	0-5	95-100	85-100	75-98	45-80	30-44	18-30
	32-70	Sandy loam, sandy clay loam.	SC, CL	A-2, A-6	0-5	95-100	85-100	70-98	30-60	20-35	11-20
GoA----- Goldsboro	0-11	Loamy sand-----	SM, SM-SC, SC	A-2, A-4, A-6	0	90-100	75-100	50-95	15-45	<25	NP-14
	11-72	Sandy clay loam, sandy loam.	SM-SC, SC, CL-ML, CL	A-2, A-4, A-6	0	98-100	95-100	60-95	25-55	16-37	4-18
Gr----- Grantham	0-11	Loam-----	ML, CL-ML	A-4	0	100	100	85-100	55-85	<30	NP-7
	11-72	Loam, clay loam, silty clay loam.	CL	A-4, A-6, A-7	0	100	100	90-100	60-95	22-49	8-30
JT----- Johnston	0-42	Loam-----	ML, SM	A-2, A-4	0	100	100	60-100	18-65	<35	NP-10
	42-52	Stratified loamy sand to sand.	SM, SP-SM	A-2, A-3	0	100	100	50-100	5-30	---	NP
	52-80	Stratified fine sandy loam to sandy loam.	SM	A-2, A-4	0	100	100	50-100	25-49	<35	NP-10
KaA----- Kalmia	0-14	Loamy sand-----	SM, SM-SC, SC	A-2	0	100	95-100	50-75	15-35	---	NP
	14-34	Sandy clay loam	SC, SM-SC	A-2, A-4, A-6	0	100	95-100	70-100	30-49	20-35	4-15
	34-80	Loamy sand, sand	SM, SP-SM, SP	A-2, A-3	0	100	95-100	50-70	4-35	---	NP
KeA----- Kenansville	0-24	Loamy sand-----	SM, SP-SM	A-1, A-2	0	100	95-100	45-99	10-25	---	NP
	24-39	Sandy loam, fine sandy loam.	SM, SC, SM-SC	A-2, A-4	0	100	95-100	50-99	20-40	<30	NP-10
	39-80	Sand, loamy sand	SP-SM, SM	A-1, A-2, A-3	0	100	95-100	40-99	5-30	---	NP
KuB----- Kureb	0-82	Sand-----	SP, SP-SM	A-3	0	100	100	60-100	0-5	---	NP

See footnote at end of table.

TABLE 14.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag-ments > 3 inches Pct	Percentage passing sieve number--				Liquid limit Pct	Plas- ticity index
			Unified	AASHTO		4	10	40	200		
LaB----- Lakeland	0-44	Sand-----	SP-SM	A-3, A-2-4	0	90-100	90-100	60-100	5-12	---	NP
	44-82	Sand, fine sand	SP, SP-SM	A-3, A-2-4	0	90-100	90-100	50-100	1-12	---	NP
LbB**: Lakeland-----	0-44	Sand-----	SP-SM	A-3, A-2-4	0	90-100	90-100	60-100	5-12	---	NP
	44-82	Sand, fine sand	SP, SP-SM	A-3, A-2-4	0	90-100	90-100	50-100	1-12	---	NP
Urban land.											
Ld----- Lenoir	0-7	Loam-----	ML, CL, CL-ML	A-4	0	100	100	85-95	60-85	<35	<10
	7-72	Clay, silty clay, silty clay loam.	CL, CH	A-6, A-7	0	100	100	85-95	55-95	30-55	11-35
Le----- Leon	0-19	Sand-----	SP, SP-SM	A-3, A-2-4	0	100	100	80-100	2-12	---	NP
	19-42	Sand, fine sand, loamy sand.	SM, SP-SM, SP	A-3, A-2-4	0	100	100	80-100	3-20	---	NP
	42-80	Sand, fine sand	SP, SP-SM	A-3, A-2-4	0	100	100	80-100	2-12	---	NP
Ly----- Lynchburg	0-10	Sandy loam-----	SM, ML, SM-SC, CL-ML	A-2, A-4	0	92-100	90-100	75-100	25-55	<30	NP-7
	10-72	Sandy clay loam, sandy loam, clay loam.	SM-SC, SC, CL, CL-ML	A-2, A-4, A-6	0	92-100	90-100	70-100	25-67	15-40	4-18
Mc----- McColl	0-7	Loam-----	SC, CL-ML, CL, SM-SC	A-4, A-6	0	100	95-100	75-90	45-65	20-40	5-20
	7-17	Clay loam, sandy clay, clay.	SC, CL	A-4, A-6, A-7	0	100	95-100	80-98	36-75	25-50	8-23
	17-43	Sandy clay loam, clay loam, sandy clay.	SC, SM-SC, CL, CL-ML	A-2, A-4, A-6	0	100	95-100	65-90	32-60	20-40	3-15
	43-72	Sandy clay loam, sandy loam, sandy clay.	SM, SC, SM-SC	A-2, A-4, A-6, A-7	0	100	95-100	60-80	30-50	15-52	3-22
Na----- Nahunta	0-7	Loam-----	ML, CL-ML, CL	A-4	0	100	95-100	80-100	51-85	<25	NP-10
	7-72	Clay loam, silty clay loam, clay.	CL	A-4, A-6, A-7	0	100	95-100	90-100	60-95	22-49	8-30
NoA, NoB----- Norfolk	0-12	Loamy sand-----	SM	A-2	0	95-100	92-100	50-91	13-30	<20	NP
	12-52	Sandy loam, sandy clay loam, clay loam.	SC, SM-SC, CL, CL-ML	A-2, A-4, A-6	0	95-100	91-100	70-96	30-55	20-38	4-15
	52-72	Sandy clay loam, clay loam, sandy clay.	SC, SM-SC, CL, CL-ML	A-4, A-6, A-7-6	0	100	98-100	65-98	36-72	20-45	4-22
Pa----- Pactolus	0-26	Loamy sand-----	SM	A-2	0	100	90-100	51-95	13-30	---	NP
	26-82	Sand, loamy sand, loamy fine sand.	SP-SM, SM	A-2, A-3	0	100	90-100	51-95	5-30	---	NP
Pg----- Pantego	0-19	Loam-----	SM, SM-SC, CL, ML	A-2, A-4	0	100	95-100	60-95	25-75	<35	NP-10
	19-58	Sandy clay loam, sandy loam, clay loam.	SC, CL, SM-SC, CL-ML	A-4, A-6, A-2	0	100	95-100	80-100	30-80	20-40	4-16
	58-72	Clay loam, sandy clay, sandy clay loam.	CL, SC	A-6, A-7	0	100	95-100	90-100	36-80	25-49	11-24

See footnote at end of table.

TABLE 14.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag-ments > 3 inches Pct	Percentage passing sieve number--				Liquid limit Pct	Plas- ticity index
			Unified	AASHTO		4	10	40	200		
Pt**: Pits.	In										
Tarboro-----	0-10	Loamy sand-----	SM, SP-SM, SW-SM	A-2, A-3, A-1	0	95-100	85-100	40-99	8-35	---	NP
	10-82	Sand, coarse sand, loamy sand.	SP, SP-SM, SW-SM, SM	A-2, A-3, A-1	0	95-100	90-100	45-100	3-15	---	NP
Ra----- Rains	0-9	Sandy loam-----	SM, ML	A-2, A-4	0	100	95-100	50-85	25-56	<35	NP-10
	9-46	Sandy clay loam, clay loam.	SC, SM-SC, CL, CL-ML	A-2, A-4, A-6	0	100	95-100	55-98	30-70	18-40	4-20
	46-63	Sandy clay loam, clay loam, sandy clay.	SC, SM-SC, CL, CL-ML	A-4, A-6, A-7	0	100	98-100	60-98	36-72	18-45	4-28
	63-72	Sandy loam, sandy clay loam, sandy clay.	SM, SC, ML, CL	A-2, A-4, A-6	0	100	95-100	60-95	30-60	15-40	3-18
Ro**: Roanoke-----	0-8	Loam-----	SM-SC, CL-ML, CL, SC	A-6, A-4	0	95-100	85-100	60-100	35-90	20-35	5-16
	8-55	Clay, silty clay, clay loam.	CH, CL	A-7	0	90-100	85-100	85-100	65-95	45-70	22-40
	55-80	Stratified sandy clay to clay.	CL-ML, GM-GC, CH, ML	A-2-4, A-4, A-6, A-7	0-5	40-100	35-100	25-95	15-90	15-60	NP-40
Wahee-----	0-6	Loam-----	ML, CL-ML	A-4	0	100	100	90-98	51-75	20-35	2-10
	6-45	Clay, clay loam, silty clay.	CL, CH	A-6, A-7	0	100	100	85-100	51-90	38-70	18-42
	45-65	Variable-----	---	---	---	---	---	---	---	---	---
Ru**: Roanoke-----	0-8	Loam-----	SM-SC, CL-ML, CL, SC	A-6, A-4	0	95-100	85-100	60-100	35-90	20-35	5-16
	8-55	Clay, silty clay, clay loam.	CH, CL	A-7	0	90-100	85-100	85-100	65-95	45-70	22-40
	55-80	Stratified sandy clay to clay.	CL-ML, GM-GC, CH, ML	A-2-4, A-4, A-6, A-7	0-5	40-100	35-100	25-95	15-90	15-60	NP-40
Urban land.											
St----- Stallings	0-10	Loamy sand-----	SM	A-2	0	100	95-100	51-100	15-35	---	NP
	10-44	Sandy loam, fine sandy loam.	SM	A-2, A-4	0	100	95-100	51-100	20-50	<25	NP-3
	44-72	Sandy loam, loamy sand, loamy fine sand.	SM, SP-SM, SM-SC	A-2, A-4	0	100	95-100	51-100	10-50	<25	NP-4
TaB----- Tarboro	0-10	Loamy sand-----	SM, SP-SM, SW-SM	A-2, A-3, A-1	0	95-100	85-100	40-99	8-35	---	NP
	10-82	Sand, coarse sand, loamy sand.	SP, SP-SM, SW-SM, SM	A-2, A-3, A-1	0	95-100	90-100	45-100	3-15	---	NP
TR**: Torhunta-----	0-14	Fine sandy loam	SM	A-2, A-4	0	100	95-100	70-85	20-49	<25	NP-4
	14-46	Sandy loam, fine sandy loam.	SM, SM-SC	A-2, A-4	0	100	95-100	70-85	20-40	<25	NP-7
	46-72	Loamy sand, sand, sandy loam.	SM, SP-SM	A-2, A-3	0	100	95-100	65-85	5-25	<25	NP-4

See footnote at end of table.

TABLE 14.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag- ments > 3 inches	Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO		4	10	40	200		
	<u>In</u>				<u>Pct</u>	4	10	40	200	<u>Pct</u>	
TR***: Lynn Haven-----	0-15	Sand-----	SP, SP-SM, SM	A-3, A-2-4	0	100	100	80-100	2-14	---	NP
	15-56	Sand, fine sand	SM, SP-SM	A-3, A-2-4	0	100	100	70-100	5-20	---	NP
	56-80	Sand, fine sand	SP, SP-SM	A-3, A-2-4	0	100	100	80-100	2-12	---	NP
Ud***. Udorthents											
Ur***. Urban land											
VaB, VaD----- Vaucluse	0-9	Loamy sand-----	SM, SP-SM	A-2, A-3	0-5	90-100	90-100	51-75	8-30	---	NP
	9-25	Sandy clay loam, sandy loam.	SC, SM-SC	A-2, A-4, A-6	0-5	90-100	90-100	51-75	25-50	20-40	5-18
	25-50	Sandy clay loam, sandy loam, sandy clay.	SC, SM-SC, SM	A-2, A-4, A-6	0-5	95-100	92-100	51-80	20-50	<40	NP-20
	50-73	Sandy loam, sandy clay loam, loamy sand.	SM, SC, SM-SC	A-2, A-4, A-6	0-2	95-100	95-100	51-90	15-50	<30	NP-12
VgE***: Vaucluse-----	0-9	Loamy sand-----	SM, SP-SM	A-2, A-3	0-5	90-100	90-100	51-75	8-30	---	NP
	9-25	Sandy clay loam, sandy loam.	SC, SM-SC	A-2, A-4, A-6	0-5	90-100	90-100	51-75	25-50	20-40	5-18
	25-50	Sandy clay loam, sandy loam, sandy clay.	SC, SM-SC, SM	A-2, A-4, A-6	0-5	95-100	92-100	51-80	20-50	<40	NP-20
	50-73	Sandy loam, sandy clay loam, loamy sand.	SM, SC, SM-SC	A-2, A-4, A-6	0-2	95-100	95-100	51-90	15-50	<30	NP-12
Gilead-----	0-13	Loamy sand-----	SP-SM, SM	A-2	0-5	90-100	75-100	55-85	10-35	---	NP
	13-32	Sandy clay, clay loam, clay.	SC, CL	A-6, A-7	0-5	95-100	85-100	75-98	45-80	30-44	18-30
	32-70	Sandy loam, sandy clay loam.	SC, CL	A-2, A-6	0-5	95-100	85-100	70-98	30-60	20-35	11-20
WaB----- Wagram	0-25	Loamy sand-----	SM, SP-SM	A-2, A-3	0	100	98-100	50-85	8-35	---	NP
	25-72	Sandy clay loam, sandy loam.	SC	A-2, A-4, A-6, A-7	0	100	98-100	60-95	31-49	21-41	8-25
WgB***: Wagram-----	0-25	Loamy sand-----	SM, SP-SM	A-2, A-3	0	100	98-100	50-85	8-35	---	NP
	25-72	Sandy clay loam, sandy loam.	SC	A-2, A-4, A-6, A-7	0	100	98-100	60-95	31-49	21-41	8-25
Urban land.											
WmB----- Wickham	0-7	Fine sandy loam	SM, SM-SC, ML, CL-ML	A-4	0	95-100	90-100	70-100	45-80	<25	NP-7
	7-46	Sandy clay loam, clay loam, sandy loam.	CL-ML, CL, SC, SM-SC	A-2, A-4, A-6, A-7-6	0	95-100	90-100	75-100	30-70	20-41	5-15
	46-80	Variable-----	---	---	---	---	---	---	---	---	---
WnB***: Wickham-----	0-7	Fine sandy loam	SM, SM-SC, ML, CL-ML	A-4	0	95-100	90-100	70-100	45-80	<25	NP-7
	7-46	Sandy clay loam, clay loam, sandy loam.	CL-ML, CL, SC, SM-SC	A-2, A-4, A-6, A-7-6	0	95-100	90-100	75-100	30-70	20-41	5-15
	46-80	Variable-----	---	---	---	---	---	---	---	---	---

See footnote at end of table.

TABLE 14.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag-ments > 3 inches	Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO		4	10	40	200		
	<u>In</u>				<u>Pct</u>					<u>Pct</u>	
WnB**: Urban land.											
Wo----- Woodington	0-11	Loamy sand-----	SM	A-2	0	100	95-100	50-100	15-49	---	NP
	11-28	Sandy loam, fine sandy loam.	SM	A-2, A-4	0	100	95-100	50-100	20-50	<25	NP-3
	28-65	Sandy loam, loamy sand, loamy fine sand.	SM, SP-SM	A-2, A-4	0	100	95-100	50-100	10-50	<25	NP-3

* NP means nonplastic

** See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 15.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS

[The symbol < means less than; > means more than. Entries under "Erosion factors--T" apply to the entire profile. Entries under "Organic matter" apply only to the surface layer. Absence of an entry indicates that data were not available or were not estimated]

Soil name and map symbol	Depth	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors		Organic matter
						K	T	
	In	In/hr	In/in	pH				Pct
AaA----- Altavista	0-11	2.0-6.0	0.12-0.20	4.5-6.0	Low-----	0.24	5	.5-3
	11-37	0.6-2.0	0.12-0.20	4.5-6.0	Low-----	0.24		
	37-80	---	---	---	-----	---		
AuA----- Autryville	0-25	>6.0	0.04-0.09	4.5-6.5	Low-----	0.10	5	.5-1
	25-39	2.0-6.0	0.08-0.13	4.5-5.5	Low-----	0.10		
	39-59	>6.0	0.03-0.08	4.5-5.5	Low-----	0.10		
	59-80	0.6-2.0	0.10-0.15	4.5-5.5	Low-----	0.17		
AyB----- Aycocock	0-13	2.0-6.0	0.15-0.20	4.5-6.0	Low-----	0.37	5	1-4
	13-80	0.6-2.0	0.15-0.20	4.5-5.5	Low-----	0.43		
BaB, BaD----- Blaney	0-25	>6.0	0.03-0.06	4.5-6.0	Low-----	0.15	5	<1
	25-34	0.2-0.6	0.05-0.10	4.5-5.5	Low-----	0.28		
	34-80	0.2-0.6	0.03-0.08	4.5-5.5	Low-----	0.28		
Blaney-----	0-25	>6.0	0.03-0.06	4.5-6.0	Low-----	0.15	5	<1
	25-34	0.2-0.6	0.05-0.10	4.5-5.5	Low-----	0.28		
	34-80	0.2-0.6	0.03-0.08	4.5-5.5	Low-----	0.28		
Urban land.								
BrB----- Bragg	0-6	2.0-6.0	0.06-0.12	4.5-5.5	Low-----	0.20	5	0-2
	6-30	0.2-0.6	0.10-0.15	4.5-5.5	Low-----	0.28		
	30-80	0.2-0.6	0.10-0.15	4.5-5.5	Low-----	0.28		
BuA----- Butters	0-9	6.0-20	0.05-0.10	4.5-5.5	Low-----	0.15	5	.5-2
	9-37	2.0-6.0	0.10-0.14	4.5-5.5	Low-----	0.15		
	37-58	6.0-20	0.03-0.08	4.5-6.5	Low-----	0.10		
	58-80	0.6-2.0	0.10-0.15	4.5-5.5	Low-----	0.17		
By----- Byars	0-18	0.6-2.0	0.15-0.20	3.6-5.5	Low-----	0.28	5	2-9
	18-80	0.06-0.2	0.14-0.18	3.6-5.5	Moderate-----	0.32		
CaB, CaD----- Candor	0-20	6.0-20	0.03-0.06	3.6-6.0	Low-----	0.10	5	.5-1
	20-30	6.0-20	0.06-0.10	3.6-5.5	Low-----	0.10		
	60-80	0.6-2.0	0.12-0.16	3.6-5.5	Low-----	0.20		
Cf----- Cape Fear	0-16	0.6-6.0	0.15-0.22	4.5-6.5	Low-----	0.15	5	5-15
	16-52	0.06-0.2	0.12-0.22	4.5-6.0	Moderate-----	0.32		
	52-62	---	---	---	-----	---		
Ch----- Chewacla	0-25	0.6-2.0	0.15-0.24	4.5-6.5	Low-----	0.28	5	1-4
	25-48	0.6-2.0	0.12-0.20	4.5-6.5	Low-----	0.28		
	48-64	0.6-2.0	0.15-0.24	4.5-6.5	Low-----	0.32		
Co----- Coxville	0-7	0.6-2.0	0.12-0.17	3.6-5.5	Low-----	0.24	5	2-4
	7-55	0.2-0.6	0.14-0.18	3.6-5.5	Moderate-----	0.32		
	55-72	---	---	---	-----	---		
CrB----- Craven	0-7	0.6-2.0	0.12-0.18	4.5-6.5	Low-----	0.37	5	.5-2
	7-58	0.06-0.2	0.12-0.15	3.6-5.5	Moderate-----	0.32		
	58-80	0.2-6.0	0.08-0.14	3.6-5.5	Low-----	0.32		
CT----- Croatan	0-37	0.06-6.0	0.35-0.45	<4.5	Low-----	---	---	25-60
	37-80	0.2-6.0	0.10-0.15	3.6-6.5	Low-----	---		
De----- Deloss	0-13	2.0-6.0	0.10-0.16	4.5-6.5	Low-----	0.24	5	2-9
	13-48	0.6-2.0	0.12-0.18	4.5-5.5	Low-----	0.24		
	48-72	---	---	---	-----	---		

See footnote at end of table.

TABLE 15.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Soil name and map symbol	Depth	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors		Organic matter
						K	T	
	In	In/hr	In/in	pH				Pct
DgA----- Dogue	0-4 4-55 55-72	2.0-6.0 0.2-0.6 0.6-6.0	0.08-0.15 0.12-0.19 0.05-0.14	3.6-5.5 3.6-5.5 3.6-5.5	Low----- Moderate----- Low-----	0.28 0.28 0.17	4	0.5-1
DhA----- Dothan	0-11 11-38 38-72	2.0-6.0 0.6-2.0 0.2-0.6	0.06-0.10 0.12-0.16 0.08-0.12	4.5-5.5 4.5-5.5 4.5-5.5	Very low----- Low----- Low-----	0.15 0.28 0.28	5	<.5
Dn----- Dunbar	0-10 10-72	2.0-6.0 0.2-0.6	0.10-0.15 0.13-0.18	4.5-5.5 3.6-5.5	Low----- Moderate-----	0.32 0.32	5	2-4
DpA----- Duplin	0-6 6-65	2.0-6.0 0.2-0.6	0.10-0.15 0.13-0.18	5.1-7.3 4.5-5.5	Low----- Moderate-----	0.24 0.28	5	.5-2
DT. Dystrochrepts								
ExA----- Exum	0-12 12-75	2.0-6.0 0.2-0.6	0.15-0.20 0.15-0.20	4.5-6.0 4.5-5.5	Low----- Low-----	0.37 0.37	5	.5-2
FaA, FaB----- Faceville	0-17 17-70	6.0-20 0.6-2.0	0.06-0.09 0.12-0.15	4.5-5.5 4.5-5.5	Low----- Low-----	0.17 0.37	5	.5-1
FcB*: Faceville-----	0-17 17-70	6.0-20 0.6-2.0	0.06-0.09 0.12-0.15	4.5-5.5 4.5-5.5	Low----- Low-----	0.17 0.37	5	.5-1
Urban land.								
FuB----- Fuquay	0-29 29-42 42-80	>6.0 0.6-2.0 0.06-0.2	0.03-0.07 0.12-0.15 0.10-0.13	4.5-6.0 4.5-6.0 4.5-6.0	Low----- Low----- Low-----	0.10 0.20 0.20	5	.5-2
GdB, GdD----- Gilead	0-13 13-32 32-70	2.0-6.0 0.06-0.6 0.2-0.6	0.05-0.09 0.12-0.16 0.10-0.15	4.5-5.5 4.5-5.5 4.5-5.5	Low----- Low----- Low-----	0.17 0.28 0.24	3	.5-1
GoA----- Goldsboro	0-11 11-72	2.0-6.0 0.6-2.0	0.08-0.12 0.11-0.15	4.5-6.0 4.5-5.5	Low----- Low-----	0.20 0.24	5	.5-2
Gr----- Grantham	0-11 11-72	2.0-6.0 0.2-0.6	0.13-0.20 0.15-0.20	4.5-5.5 3.6-5.5	Low----- Low-----	0.37 0.43	5	2-4
JT----- Johnston	0-42 42-52 52-80	2.0-6.0 6.0-20 6.0-20	0.10-0.20 0.02-0.07 0.06-0.12	4.5-5.5 4.5-5.5 4.5-5.5	Low----- Low----- Low-----	0.20 0.17 0.17	5	3-8
KaA----- Kalmia	0-14 14-34 34-80	2.0-6.0 0.6-2.0 6.0-20	0.06-0.10 0.12-0.16 0.03-0.06	4.5-6.0 4.5-5.5 4.5-5.5	Low----- Low----- Low-----	0.15 0.24 0.10	5	.5-2
KeA----- Kenansville	0-24 24-39 39-80	6.0-20 2.0-6.0 6.0-20	0.04-0.10 0.10-0.14 <0.05	4.5-6.0 4.5-6.0 4.5-6.0	Low----- Low----- Low-----	0.15 0.15 0.10	5	.5-2
KuB----- Kureb	0-82	6.0-20	<0.05	4.5-7.3	Low-----	0.10	5	<.5
LaB----- Lakeland	0-44 44-82	6.0-20 6.0-20	0.05-0.09 0.02-0.08	4.5-6.0 4.5-6.0	Low----- Low-----	0.10 0.10	5	>1
LbB*: Lakeland-----	0-44 44-82	6.0-20 6.0-20	0.05-0.09 0.02-0.08	4.5-6.0 4.5-6.0	Low----- Low-----	0.10 0.10	5	>1
Urban land.								

See footnote at end of table.

TABLE 15.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Soil name and map symbol	Depth	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors		Organic matter
						K	T	
	In	In/hr	In/in	pH				Pct
Ld----- Lenoir	0-7 7-72	0.6-2.0 0.06-0.2	0.14-0.18 0.13-0.15	4.5-5.5 4.5-5.5	Low----- Moderate-----	0.37 0.32	5	2-4
Le----- Leon	0-19 19-42 42-80	6.0-20 0.6-6.0 0.6-6.0	0.02-0.05 0.05-0.10 0.02-0.05	3.6-5.5 3.6-5.5 3.6-5.5	Low----- Low----- Low-----	0.10 0.20 0.17	5	.5-4
Ly----- Lynchburg	0-10 10-72	2.0-6.0 0.6-2.0	0.09-0.13 0.12-0.16	3.6-5.5 3.6-5.5	Low----- Low-----	0.20 0.20	5	.5-5
Mc----- McColl	0-7 7-17 17-43 43-72	0.6-2.0 0.2-0.6 0.06-0.2 0.2-2.0	0.12-0.16 0.13-0.17 0.07-0.11 0.08-0.12	4.5-7.3 4.5-5.5 4.5-5.5 4.5-5.5	Low----- Low----- Low----- Low-----	0.24 0.24 0.24 0.32	5	1-8
Na----- Nahunta	0-7 7-72	2.0-6.0 0.2-0.6	0.15-0.20 0.15-0.20	4.5-6.0 3.6-5.5	Low----- Low-----	0.43 0.43	5	2-4
NoA, NoB----- Norfolk	0-12 12-52 52-72	6.0-20 0.6-2.0 0.6-2.0	0.06-0.11 0.10-0.15 0.10-0.15	4.5-6.0 4.5-5.5 4.5-5.5	Low----- Low----- Low-----	0.20 0.24 0.24	5	.5-2
Pa----- Pactolus	0-26 26-82	6.0-20 6.0-20	0.05-0.10 0.03-0.07	4.5-6.0 4.5-5.5	Low----- Low-----	0.10 0.10	5	.5-2
Pg----- Pantego	0-19 19-58 58-72	2.0-6.0 0.6-2.0 0.6-2.0	0.10-0.20 0.12-0.20 0.15-0.20	3.6-5.5 3.6-5.5 3.6-5.5	Low----- Low----- Low-----	0.15 0.28 0.28	5	4-10
Pt*: Pits.								
Tarboro-----	0-10 10-82	6.0-20 >20	0.05-0.09 0.02-0.06	5.1-6.5 5.1-6.5	Low----- Low-----	0.10 0.10	5	.5-1
Ra----- Rains	0-9 9-46 46-63 63-72	2.0-6.0 0.6-2.0 0.6-2.0 0.6-2.0	0.08-0.12 0.10-0.15 0.10-0.15 0.10-0.15	4.5-6.5 4.5-5.5 4.5-5.5 4.5-5.5	Low----- Low----- Low----- Low-----	0.20 0.24 0.28 0.28	5	1-6
Ro*: Roanoke-----	0-8 8-55 55-80	0.6-2.0 0.06-0.2 0.06-20	0.14-0.20 0.10-0.19 0.04-0.14	4.5-5.5 4.5-5.5 4.5-5.5	Low----- Moderate----- Moderate-----	0.37 0.24 0.24	4	.5-3
Wahee-----	0-6 6-45 45-65	0.2-2.0 0.06-0.2 0.2-0.6	0.15-0.20 0.12-0.20 0.12-0.20	4.5-6.0 3.6-5.5 3.6-5.5	Low----- Moderate----- Moderate-----	0.28 0.28 0.28	5	.5-5
Ru*: Roanoke-----	0-8 8-55 55-80	0.6-2.0 0.06-0.2 0.06-20	0.14-0.20 0.10-0.19 0.04-0.14	4.5-5.5 4.5-5.5 4.5-5.5	Low----- Moderate----- Moderate-----	0.37 0.24 0.24	4	.5-3
Urban land.								
St----- Stallings	0-10 10-44 44-72	6.0-20 2.0-6.0 2.0-20	0.06-0.11 0.10-0.15 0.06-0.15	3.6-5.5 3.6-5.5 3.6-5.5	Low----- Low----- Low-----	0.10 0.17 0.17	5	1-4
TaB----- Tarboro	0-10 10-82	6.0-20 >20	0.05-0.09 0.02-0.06	5.1-6.5 5.1-6.5	Low----- Low-----	0.10 0.10	5	.5-1
TR*: Torhunta-----	0-14 14-46 46-72	2.0-6.0 2.0-6.0 6.0-20	0.10-0.15 0.10-0.15 <0.05	3.6-5.5 3.6-5.5 3.6-6.5	Low----- Low----- Low-----	0.15 0.15 0.10	5	3-10

See footnote at end of table.

TABLE 15.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Soil name and map symbol	Depth	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors		Organic matter
						K	T	
	In	In/hr	In/in	pH				Pct
TR*: Lynn Haven-----	0-15 15-56 56-80	6.0-20 0.6-6.0 >20	0.05-0.10 0.10-0.20 0.01-0.05	3.6-5.5 3.6-5.5 3.6-5.5	Low----- Low----- Low-----	0.10 0.15 0.10	5	1-4
Ud*. Udorthents								
Ur*. Urban land								
VaB, VaD----- Vaucluse	0-9 9-25 25-50 50-73	6.0-20 0.6-6.0 0.06-0.6 2.0-6.0	0.04-0.08 0.10-0.15 0.04-0.08 0.04-0.08	4.5-6.0 3.6-5.5 3.6-5.5 3.6-5.5	Low----- Low----- Low----- Low-----	0.15 0.24 0.24 0.17	3	<1
VgE*: Vaucluse-----	0-9 9-25 25-50 50-73	6.0-20 0.6-6.0 0.06-0.6 2.0-6.0	0.04-0.08 0.10-0.15 0.04-0.08 0.04-0.08	4.5-6.0 3.6-5.5 3.6-5.5 3.6-5.5	Low----- Low----- Low----- Low-----	0.15 0.24 0.24 0.17	3	<1
Gilead-----	0-13 13-32 32-70	2.0-6.0 0.06-0.6 0.2-0.6	0.05-0.09 0.12-0.16 0.10-0.15	4.5-5.5 4.5-5.5 4.5-5.5	Low----- Low----- Low-----	0.17 0.28 0.24	3	.5-1
WaB----- Wagram	0-25 25-72	6.0-20 0.6-2.0	0.05-0.08 0.12-0.16	4.5-6.0 4.5-6.0	Low----- Low-----	0.15 0.20	5	.5-2
WgB*: Wagram-----	0-25 25-72	6.0-20 0.6-2.0	0.05-0.08 0.12-0.16	4.5-6.0 4.5-6.0	Low----- Low-----	0.15 0.20	5	.5-2
Urban land.								
WmB----- Wickham	0-7 7-46 46-80	2.0-6.0 0.6-2.0 ---	0.11-0.16 0.12-0.17 ---	4.5-6.0 4.5-6.0 ---	Low----- Low----- ---	0.24 0.24 ---	5	.5-2
WnB*: Wickham-----	0-7 7-46 46-80	2.0-6.0 0.6-2.0 ---	0.11-0.16 0.12-0.17 ---	4.5-6.0 4.5-6.0 ---	Low----- Low----- ---	0.24 0.24 ---	5	.5-2
Urban land.								
Wo----- Woodington	0-11 11-28 28-65	6.0-20 2.0-6.0 2.0-20	0.06-0.11 0.10-0.15 0.06-0.15	3.6-5.5 3.6-5.5 3.6-5.5	Low----- Low----- Low-----	0.10 0.20 0.10	5	2-4

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 16.--SOIL AND WATER FEATURES

["Flooding" and "water table" and terms such as "rare," "brief," "apparent," and "perched" are explained in the text. The symbol > means more than. Absence of an entry indicates that the feature is not a concern]

Soil name and map symbol	Hydrologic group	Flooding			High water table			Risk of corrosion	
		Frequency	Duration	Months	Depth Ft	Kind	Months	Uncoated steel	Concrete
AaA----- Altavista	C	Rare-----	---	---	1.5-2.5	Apparent	Dec-Mar	Moderate	Moderate.
AuA----- Autryville	A	None-----	---	---	4.0-6.0	Apparent	Jan-Apr	Low-----	High.
AyB----- Aycock	B	None-----	---	---	4.0-6.0	Perched	Jan-Apr	Moderate	High.
BaB, BaD----- Blaney	B	None-----	---	---	>6.0	---	---	Moderate	High.
BdB*, BdD*:----- Blaney----- Urban land.	B	None-----	---	---	>6.0	---	---	Moderate	High.
BrB----- Bragg	C	None-----	---	---	>6.0	---	---	Moderate	High.
BuA----- Butters	B	None-----	---	---	4.0-5.0	Apparent	Jan-Mar	Low-----	Moderate.
By**----- Byars	D	None-----	---	---	+1-1.0	Apparent	Nov-Apr	High-----	High.
CaB, CaD----- Candor	A	None-----	---	---	>6.0	---	---	Low-----	Low.
Cf----- Cape Fear	D	Rare-----	---	---	0-1.5	Apparent	Dec-Apr	High-----	High.
Ch----- Chewacla	C	Frequent----	Brief-----	Nov-Apr	0.5-1.5	Apparent	Nov-Apr	High-----	Moderate.
Co----- Coxville	D	None-----	---	---	0-1.5	Apparent	Nov-Apr	High-----	High.
CrB----- Craven	C	None-----	---	---	2.0-3.0	Apparent	Dec-Apr	High-----	High.
CT----- Croatan	D	Rare-----	---	---	0-1.0	Apparent	Dec-May	High-----	High.
De**----- Deloss	***B/D	Rare-----	---	---	+1-1.0	Apparent	Nov-Apr	High-----	High.
DgA----- Dogue	C	Rare-----	---	---	1.5-3.0	Apparent	Jan-Mar	High-----	High.
DhA----- Dothan	B	None-----	---	---	3.0-5.0	Perched	Jan-Apr	Moderate	Moderate.
Dn----- Dunbar	D	None-----	---	---	1.0-2.5	Apparent	Nov-May	High-----	High.
DpA----- Duplin	C	None-----	---	---	2.0-3.0	Apparent	Dec-Apr	High-----	High.
DT----- Dystrochrepts	C	Rare-----	---	---	>6.0	---	---	High-----	Moderate.

See footnote at end of table.

TABLE 16.--SOIL AND WATER FEATURES--Continued

Soil name and map symbol	Hydrologic group	Flooding			High water table			Risk of corrosion	
		Frequency	Duration	Months	Depth Ft	Kind	Months	Uncoated steel	Concrete
ExA----- Exum	C	None-----	---	---	2.0-3.0	Apparent	Dec-Apr	Moderate	High.
FaA, FaB----- Faceville	B	None-----	---	---	>6.0	---	---	Low-----	Moderate.
FcB*: Faceville----- Urban land.	B	None-----	---	---	>6.0	---	---	Low-----	Moderate.
FuB----- Fuquay	B	None-----	---	---	4.0-6.0	Perched	Jan-Mar	Low-----	High.
GdB, GdD----- Gilead	C	None-----	---	---	1.5-2.5	Perched	Jan-Mar	Moderate	High.
GoA----- Goldsboro	B	None-----	---	---	2.0-3.0	Apparent	Dec-Apr	Moderate	High.
Gr----- Grantham	D	None-----	---	---	0-1.0	Apparent	Dec-May	High-----	High.
JT**----- Johnston	D	Frequent----	Brief to long.	Nov-Jul	+1-1.5	Apparent	Nov-Jun	High-----	High.
KaA----- Kalmia	B	Rare-----	---	---	>6.0	---	---	Moderate	Moderate.
KeA----- Kenansville	A	Rare-----	---	---	>6.0	---	---	Low-----	High.
KuB----- Kureb	A	None-----	---	---	>6.0	---	---	Low-----	Low.
LaB----- Lakeland	A	None-----	---	---	>6.0	---	---	Low-----	Moderate.
LbB*: Lakeland----- Urban land.	A	None-----	---	---	>6.0	---	---	Low-----	Moderate.
Ld----- Lenoir	D	None-----	---	---	1.0-2.5	Apparent	Dec-May	High-----	High.
Le----- Leon	***B/D	None-----	---	---	0-1.0	Apparent	Jun-Feb	High-----	High.
Ly----- Lynchburg	C	None-----	---	---	0.5-1.5	Apparent	Nov-Apr	High-----	High.
Mc**----- McColl	D	None-----	---	---	+1-1.0	Apparent	Nov-Apr	High-----	High.
Na----- Nahunta	C	None-----	---	---	1.0-2.5	Apparent	Dec-May	High-----	High.
NoA, NoB----- Norfolk	B	None-----	---	---	4.0-6.0	Apparent	Jan-Mar	Moderate	High.
Pa----- Pactolus	***A/C	None-----	---	---	1.5-3.0	Apparent	Dec-Apr	Low-----	High.
Pg----- Pantego	***B/D	None-----	---	---	0-1.5	Apparent	Dec-May	High-----	High.

See footnote at end of table.

TABLE 16.--SOIL AND WATER FEATURES--Continued

Soil name and map symbol	Hydrologic group	Flooding			High water table			Risk of corrosion	
		Frequency	Duration	Months	Depth Ft	Kind	Months	Uncoated steel	Concrete
Pt*: Pits.									
Tarboro-----	A	Rare-----	---	---	>6.0	---	---	Low-----	Moderate.
Ra----- Rains	***B/D	None-----	---	---	0-1.0	Apparent	Nov-Apr	High-----	High.
Ro*: Roanoke-----	D	Rare-----	---	---	0-1.0	Apparent	Nov-May	High-----	High.
Wahee-----	D	Rare-----	---	---	0.5-1.5	Apparent	Dec-Mar	High-----	High.
Ru*: Roanoke-----	D	Rare-----	---	---	0-1.0	Apparent	Nov-May	High-----	High.
Urban land.									
St----- Stallings	C	None-----	---	---	1.0-2.5	Apparent	Dec-Apr	High-----	High.
TaB----- Tarboro	A	Rare-----	---	---	>6.0	---	---	Low-----	Moderate.
TR*: Torhunta-----	C	None-----	---	---	0.5-1.5	Apparent	Dec-May	High-----	High.
Lynn Haven-----	***B/D	None-----	---	---	0-1.0	Apparent	Jun-Feb	High-----	High.
Ud. Udorthents									
Ur*. Urban land									
VaB, VaD----- Vaucluse	C	None-----	---	---	>6.0	---	---	Low-----	High.
VgE*: Vaucluse-----	C	None-----	---	---	>6.0	---	---	Low-----	High.
Gilead-----	C	None-----	---	---	1.5-2.5	Perched	Jan-Mar	Moderate	High.
WaB----- Wagram	A	None-----	---	---	>6.0	---	---	Low-----	High.
WgB*: Wagram-----	A	None-----	---	---	>6.0	---	---	Low-----	High.
Urban land.									
WmB----- Wickham	B	Rare-----	---	---	>6.0	---	---	Moderate	High.
WnB*: Wickham-----	B	Rare-----	---	---	>6.0	---	---	Moderate	High.
Urban land.									
Wo----- Woodington	***B/D	None-----	---	---	0.5-1.0	Apparent	Dec-May	High-----	High.

* See description of the map unit for composition and behavior characteristics of the map unit.

** A plus sign under "Depth to high water table" indicates that the water table is above the surface of the soil.

*** Soils which have a seasonal high water table but which can be drained. The first letter refers to the drained condition; the second to the undrained condition.

TABLE 17.--ENGINEERING INDEX TEST DATA

[Dashes indicate data were not available. NP means nonplastic]

Soil name, report number, horizon, and depth in inches	Classification		Grain size distribution							Liquid limit	Plasticity index	Moisture density	
			Percentage passing sieve--				Percentage smaller than--					Max. Dry density	Optimum moisture
	AASHTO	Unified	No. 4	No. 10	No. 40	No. 200	.02 mm	.005 mm	.002 mm				
Blaney: ¹ (S74NC093-008)													
E-----7 to 27	A-1-6	SP-SM	100	92	40	9	7	4	2	-	NP	114	12
Bt1-----27 to 39	A-2-7	SM	100	95	34	22	21	19	17	46	19	120	12
Bt2-----48 to 64	A-2-4	SC	100	91	33	19	18	15	13	33	10	124	11
Candor: ² (S74NC051-002)													
E1-----8 to 33	A-2-4	SP-SM	100	100	72	12	7	4	3	-	NP	116	10
Bt1-----43 to 50	A-2-4	SM	100	100	74	22	18	15	13	21	3	116	10
Bt3-----60 to 80	A-7-6	SC	100	100	81	41	33	30	28	44	22	112	16
Croatan: ³ (S74NC051-003)													
Cg-----37 to 52	A-2-4	SM	100	100	76	25	10	5	4	-	NP	118	10
Cg-----52 to 64	A-4	SM	100	100	81	42	16	4	3	-	NP	122	8
Dothan: ³ (S74NC093-009)													
Ap-----0 to 7	A-2-4	SM	100	100	77	27	13	7	4	-	NP	120	09
Bt1-----11 to 25	A-6	SC	100	99	77	46	36	30	26	33	16	116	13
Bt2-----25 to 38	A-7-6	CL	100	100	82	53	46	40	37	45	23	108	18
Bt3-----38 to 63	A-7-6	CL	100	99	81	50	43	37	34	44	19	109	17
Faceville: ² (S74NC051-006)													
Ap-----0 to 7	A-2-4	SM	100	100	84	22	8	4	2	-	NP	112	10
Bt1-----17 to 52	A-7-6	CL	100	100	84	52	46	43	41	49	23	107	18
Bt2-----52 to 70	A-7-6	SC	100	100	86	46	37	34	33	46	21	109	17
Fuquay: ³ (S74NC093-007)													
E-----3 to 29	A-2-4	SM	100	100	80	18	8	4	2	-	NP	115	10
Be-----29 to 42	A-2-4	SM	100	100	79	26	19	15	13	20	2	124	10
Bt1-----42 to 60	A-7-6	SC	100	100	81	41	34	30	28	45	21	107	18
Woodington: ³ (S74NC051-004)													
A-----0 to 5	A-2-4	SM	100	100	71	26	19	11	6	-	NP	108	14
Btg-----11 to 28	A-2-4	SM	100	100	63	25	21	15	11	17	3	126	10
BCg1-----28 to 37	A-2-4	SM	100	100	65	22	18	13	9	14	2	127	09

¹ This pedon is a taxadjunct to the Blaney series, because the medium and coarse sand content in the A horizon and the liquid limit of the Bt horizon are higher than allowed for the series. Pedon located about 8 miles west of Raeford in Hoke County, from the intersection of State Road 1218 and 1214, 1.5 miles southeast along State Road 1214, then 200 feet northwest of the road.

² Pedon located about 1 mile east of Interstate 95 interchange at Hope Mills along State Road 2252, 0.7 mile northeast along a field road and 100 feet north of field road in an idle field in Cumberland County.

³ This is a typical pedon for the series. See the section, soil series and their morphology for the location of the pedon.

TABLE 18.--CLASSIFICATION OF THE SOILS

Soil name	Family or higher taxonomic class
Altavista-----	Fine-loamy, mixed, thermic Aquic Hapludults
Autryville-----	Loamy, siliceous, thermic Arenic Paleudults
Aycock-----	Fine-silty, siliceous, thermic Typic Paleudults
Blaney-----	Loamy, siliceous, thermic Arenic Hapludults
Bragg-----	Fine-loamy, siliceous, acid, thermic Typic Udorthents
Butters-----	Coarse-loamy, siliceous, thermic Typic Paleudults
Byars-----	Clayey, kaolinitic, thermic Umbric Paleaquults
Candor-----	Sandy, siliceous, thermic Arenic Paleudults
Cape Fear-----	Clayey, mixed, thermic Typic Umbraquults
Chewacla-----	Fine-loamy, mixed, thermic Fluvaquentic Dystrochrepts
Coxville-----	Clayey, kaolinitic, thermic Typic Paleaquults
Craven-----	Clayey, mixed, thermic Aquic Hapludults
Croatan-----	Loamy, siliceous, dysic, thermic Terric Medisaprists
Deloss-----	Fine-loamy, mixed, thermic Typic Umbraquults
Dogue-----	Clayey, mixed, thermic Aquic Hapludults
Dothan-----	Fine-loamy, siliceous, thermic Plinthic Paleudults
Dunbar-----	Clayey, kaolinitic, thermic Aeric Paleaquults
Duplin-----	Clayey, kaolinitic, thermic Aquic Paleudults
Dystrochrepts-----	Loamy, thermic Dystrochrepts
Exum-----	Fine-silty, siliceous, thermic Aquic Paleudults
Faceville-----	Clayey, kaolinitic, thermic Typic Paleudults
Fuquay-----	Loamy, siliceous, thermic Arenic Plinthic Paleudults
Gilead-----	Clayey, kaolinitic, thermic Aquic Hapludults
Goldsboro-----	Fine-loamy, siliceous, thermic Aquic Paleudults
Grantham-----	Fine-silty, siliceous, thermic Typic Paleaquults
Johnston-----	Coarse-loamy, siliceous, acid, thermic Cumulic Humaquepts
Kalmia-----	Fine-loamy over sandy or sandy-skeletal, siliceous, thermic Typic Hapludults
Kenansville-----	Loamy, siliceous, thermic Arenic Hapludults
Kureb-----	Thermic, uncoated Spodic Quartzipsamments
Lakeland-----	Thermic, coated Typic Quartzipsamments
Lenoir-----	Clayey, mixed, thermic Aeric Paleaquults
Leon-----	Sandy, siliceous, thermic Aeric Haplaquods
Lynchburg-----	Fine-loamy, siliceous, thermic Aeric Paleaquults
Lynn Haven-----	Sandy, siliceous, thermic Typic Haplaquods
McColl-----	Clayey, kaolinitic, thermic Typic Fraguaquults
Nahunta-----	Fine-silty, siliceous, thermic Aeric Paleaquults
Norfolk-----	Fine-loamy, siliceous, thermic Typic Paleudults
Pactolus-----	Thermic, coated Aquic Quartzipsamments
Pantego-----	Fine-loamy, siliceous, thermic Umbric Paleaquults
Rains-----	Fine-loamy, siliceous, thermic Typic Paleaquults
Roanoke-----	Clayey, mixed, thermic Typic Ochraqults
Stallings-----	Coarse-loamy, siliceous, thermic Aeric Paleaquults
Tarboro-----	Mixed, thermic Typic Udipsamments
Torhunta-----	Coarse-loamy, siliceous, acid, thermic Typic Humaquepts
Vaucluse-----	Fine-loamy, siliceous, thermic Typic Hapludults
Wagram-----	Loamy, siliceous, thermic Arenic Paleudults
Wahee-----	Clayey, mixed, thermic Aeric Ochraqults
Wickham-----	Fine-loamy, mixed, thermic Typic Hapludults
Woodington-----	Coarse-loamy, siliceous, thermic Typic Paleaquults

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